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TREATISE

ON

GYNÆCOLOGY

MEDICAL AND SURGICAL

BY

S. POZZI, M.D.

Professeur Agrégé à la Faculté de Médecine ; Chirurgien de l'Hôpital Lourcine-Pascal Paris ; Honorary Fellow of the American Gynæcological Society.

Translated from the French Edition under the Supervision of, and with Additions by

BROOKS H. WELLS, M.D.

Lecturer on Gynæcology at the New York Polyclinic ; Fellow of the New York Obstetrical Society, and the New York Academy of Medicine.

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AUTHOR'S PREFACE TO FRENCH EDITION.

This work is the result of several years of practical experience as chief of a hospital service at Lourcine, devoted especially to the diseases of women. The materials for the works published by Huguier, Bernutz and Goupil, Alph. Guérin, De Martineau, and their pupils were gathered from the same field. Thanks to the increased facilities offered in gynæcological surgery by the addition of the Pascal Annex, I have for six years been able to give regular gynæcological instruction. Moreover, the kindness of the dean, M. Brouardel, has permitted me to conduct a free supplementary course of gynæcology at the Faculté de Médecine. The lessons there given have served as an outline in the compilation of this book. Furthermore, I have, in the course of several journeys abroad, studied the methods of the principal gynæcologists of England, Germany, and Austria, and compared their instructions with those of the Faculté of Paris, where my own studies were pursued.

It is impossible to ignore the great prominence which gynæcology has everywhere assumed. The origin of its rapid progress is easy to trace. By the introduction of antisepsis a new era was opened to gynæcology as well as to general surgery. Active intervention has become almost free from danger in many diseases which used to be abandoned to palliative or disguised expectant treatment. Thanks to antisepsis, new operations have been invented, and old ones restored to favor. Some of the latter had been boldly conceived and brilliantly performed by our predecessors, but the terrific mortality due to surgical uncleanliness had caused their abandonment. Such was the case with ovariotomy, vaginal hysterectomy, curetting, and even shortening the round ligaments; their present use is merely a revival.

Previous to Pasteur's great discovery, rendered fruitful by Lister, boldness in operative medicine was sheer temerity. If an occasional success raised hopes, they were at once destroyed by a series of mishaps. In 1822 Sauter (of Constance) obtained the first successful

result in vaginal hysterectomy for the cure of cancer. After this one isolated cure, eleven consecutive deaths followed the first eleven operations performed in imitation of his, and in all probability a complete list of the victims has never been published. Scarcely twenty years ago, surgery had fallen into discouragement and had renounced all active measures in a great part of the gynæcological field. Accidents during labor or the *consequences of labor* were left in the hands of *accoucheurs*, and the numerous forms of metritis, nearly all displacements, and reflex nervous disorders, perimetritic inflammations, etc., to the general practitioner. Thus dismembered and parcelled out among surgeons, general physicians, and obstetricians, gynæcology was far from forming the definite and distinct branch of the healing art that it does at the present day. Not so very long ago a good operator was a good surgeon, the two terms being almost synonymous. This is no longer the case. It has become of even more importance to avoid infection of the wound than to operate brilliantly.

Antisepsis has now triumphantly overcome all opposition; all our instructors teach it, and the younger generation practise it with the fervor inspired by new religions. We are as well armed for the strife as our neighbors. Let us profit by their experience, and avoid the operative excesses into which they have too often fallen.

In view of these tendencies, which, it is to be feared, have sometimes caused the sacrifice of a careful clinical study of the disease, and a patient and exact determination of the diagnosis and prognosis to the *éclat* of immediate results, it seems to me that a definite *rôle* falls naturally to the lot of French gynæcology. Let it accept without qualification the bold and useful inventions of foreign origin, but let it exercise a more solicitous surveillance over what is in reality the highest part of our art, an exact interpretation of indications. There will then be no missing link in the chain of its records, and its future will be worthy of its glorious past.

This past is too little remembered at the present day. We ourselves are not proud enough of our long scientific lineage, which made us the teachers of other nations, in gynæcology as well as in all the other branches of the healing art. This is an opportune moment to recall it to the memory of those among us who choose to neglect our works, and who were quick to announce our decline at a time our activity were temporarily retarded. Are not modern methods of exploration, operations in use at the present day, new departures in gynæcological nosology largely of French origin? Bimanual explora-

tion, which has been said to be a more valuable aid to investigation than even the speculum, was introduced in France by Puzos in 1753, and adopted by Levret and Baudelocque long before Kiwisch, Veit, and Schultze revived its use. The speculum, forgotten since the days of antiquity, of Soranus and Paul of Æginus, first reappears in the works of Ambroise Paré, the illustrious Father of French Surgery, then in the surgical armamentarium published by Cullet, and finally assumes definite importance in the hands of Récamier, physician of l'Hôtel-Dieu, who introduced it into general use. Neither Lair nor Simpson nor Kiwisch were the ones to discover the diagnostic value of measuring the uterus with the uterine sound; the great French obstetrician Levret, in 1771, was the discoverer, and Huguier, the eminent surgeon of Lourcine, was the one who, after rescuing hysterometry from the discredit into which it had fallen, formulated the indications for its use.

Shall I speak of operations? Curetting was invented by a Frenchman, Récamier; the operation for vesico-vaginal fistula was first scientifically established and successfully used, in a hitherto unknown degree, by a Frenchman, Jobert de Lamballe. The surgeons who first attacked polypi, either by ligature (Levret) or boldly with a cutting instrument (Dupuytren) were French. The one who first had the daring to enucleate fibromata in the uterine tissue (Amussat) was French. In France, Récamier performed, if not the first, at least the second, successful vaginal hysterectomy for cancer. It was in France (in Strasburg), that our eminent compatriot Kœberlé was one of the first who of deliberate purpose (and not accidentally, like the greater number of his predecessors) opened the abdomen to remove an interstitial uterine fibroid. It was in Paris that Péan established a plan of technique for abdominal hysterectomy which was classical for many years.

If we pass to nosology, to the anatomico-pathological and clinical study of diseases, here again we meet a crowd of French leaders, and we have only an *embarras de choix:* Huguier for diseases of the external genitals and supravaginal hypertrophic elongation of the cervix; Nélaton for retro-uterine hematocele; Valleix, Aran, Bernutz and Goupil, Gallard, Alphonse Guérin, for peri- and parametric inflammations; Malassez and De Sinéty, Cornil for the pathological anatomy of ovarian cysts, endometritis, etc.

I will pause here lest this legitimate reclamation become a panegyric. I merely wished to show that our patriotism has every cause

to be at ease on questions of bibliography, and that when we quote from a foreign author we often do no more than to take back our own capital with the accumulated interest thereon.

I have largely consulted foreign publications, and have quoted as many English, American, and German as French names. It is possible that I may be criticised for so doing, but "For whoever thinks, there is neither French nor English," said Voltaire.

My endeavor has been as far as possible to present an exact statement of the present condition of science in all countries, without giving a cumbersome mass of detail. For that reason I have abstained from dwelling at any length upon historical data preceding the antiseptic period, although I have not neglected any occasion to assert any just claims of priority upon the part of operators, without regard to nationality.

In respect to bibliography, I have thought it best not to make exhaustive extracts from the enormous mass of documents which I could easily have reached through special indexes—*Revue des Sciences Médicales*, *Index Catalogue*, *Index medicus*, *Centralblatt*, etc. This cheap form of erudition seems to me of more ostentatious value to the compiler than of real use to the reader. Those desirous of pursuing the subject farther can have ready access to these publications. There was a time (not so very remote) when a complete bibliography was essential to the compiling of any book. That time is past. At the present day we are obliged to be incomplete, in view of the enormous and constant accumulation of literary matter upon medical topics. It is better to frankly acknowledge this inevitable necessity, and make a choice of what we consider worthy of quotation. For my part, I have limited myself to advising a consultation, upon each subject, of the most recent and best works that I had been able to find. I have given the fullest list of references in regard to the questions which excite the most interest at the present day, or about which there is the most dispute (Battey's operation, hysteropexy, etc.). I have made very few quotations at second hand, and those I have been careful to verify.

In a book designed for instruction, the author is always placed between two horns of a dilemma. Either he is in danger of sacrificing everything to perspicuity, dwelling upon outlines and leaving in the shade many details which might interfere with the schematic clearness of his sketch, in which case he is in danger of being incomplete and sometimes artificial; or else he tries to omit nothing from his

picture, even though the addition of details and matter of secondary importance takes something from the prominence of the chief topics; he runs the risk in this case of being heavy and diffuse.

I have constantly endeavored to steer clear of this double danger, and, although I cannot claim entire success, yet I can claim to have done my best to that end. I deemed it essential to dwell at length upon the more recent gynæcological operations, which were often incompletely reported by my French predecessors, and somewhat obscurely described in the many existing translations of foreign works. On the other hand, it seemed unnecessary to give a detailed anatomical description of the female genital organs; I contented myself with a few indispensable general indications quite sufficient for a work on pathology. The only details entered into are in reference to the external organs of generation, where certain views had to be stated, in regard to their development and homology, which seemed to me to throw light upon the origin of some interesting malformations.

Many of my illustrations are original; they were drawn under my direction by M. Nicolet, who is both skilful and intelligent. I have also borrowed largely from various treatises and monographs. In every case where these illustrations had any originality, I acknowledged their source, omitting this formality only in the case of those which came from classical works known by every one, and which have been so often reproduced as to be almost public property.

Professor Cornil kindly gave me permission to reproduce the remarkable histological illustrations of his lessons on endometritis, cancer, salpingitis, and genital tuberculosis. Professor Wyder was good enough to allow me to make reduced copies of the valuable plates in his atlas. M. Toupet, with his well-known ability and courtesy, made several anatomical examinations for me, relative to salpingitis and follicular ovarian cysts. A few illustrations were kindly lent by MM. L. le Fort, Tarnier, Doléris, Dumoret, Marcel Baudouin, Poirier, Laroyenne, Collin, Mathieu, Aubry, Raynal, Dupont.

My good friend Professor Testut and my brother, Dr. Adrien Pozzi (of Rheims), deserve my gratitude, the one for making out the indexes, the other for correcting the proofs.

Finally, I wish to thank the publisher, my friend M. Georges Masson, whose faithful co-operation has greatly facilitated the execution of my laborious undertaking.

PARIS, July 22d, 1890.

EDITOR'S PREFACE.

The treatise here given to English readers is undoubtedly the best work on gynæcology which has appeared for many years in any language. The cosmopolitan spirit of its author, shown in his exhaustive research and judicious appreciation of the work of other nations, together with his keen and mature judgment in utilizing the material from his own rich clinical fields, make it a clear and reliable guide to the most advanced and best practice in this specialty.

But few changes have been made or thought necessary, the endeavor having been to follow the original as closely as possible. A number of editorial notes have been added. They refer mainly to minor points and have been enclosed in brackets. Certain cuts of specula, complicated examination tables, and pessaries have been omitted or replaced by others, and a few new illustrations have been added. Six full-page colored lithographic plates have been inserted in the first volume and nine in the second. These illustrate important portions of the text; some of them are new and some are taken from the *American Journal of Obstetrics*. The voluminous bibliographical notes which enrich the work have been transferred from their original position, at the foot of each page, to the end of each chapter —an arrangement which improves the appearance of the work and is equally convenient for reference. I am indebted to Drs. Aimée Raymond and Alfred E. Thayer, of this city, for assistance in the translation, and in the preparation of the index.

B. H. W.

71 West 45th Street, January 1st, 1892.

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CLINICAL AND OPERATIVE GYNÆCOLOGY.

CHAPTER I.

ANTISEPSIS IN GYNÆCOLOGY.

The general laws of surgical antisepsis are applicable in the main to gynæcology, but there are certain surgical details and technical processes which it is necessary to emphasize and describe at length. These details fall naturally into two divisions; the first relating to operations through the natural passages upon the vagina, cervix uteri, and uterine cavity; the second to operations through artificial openings involving the peritoneum.

Antisepsis of Operations through Natural Openings.

A. Of the Operator.—Absolute cleanliness of the hands is of great importance in general surgery, but is pre-eminently a matter of necessity where there is to be manipulation of the vaginal or uterine cavities; for in these situations pathogenic germs find a culture-medium essentially favorable to their development, and infection is rapidly initiated. The nails must be carefully cleaned with a smooth-pointed file; the hands and arms to the elbow should be scrubbed for three or four minutes with soap and a stiff brush in hot water. The towels used should have been rendered aseptic in a sterilizing oven. (Foster's experiments have shown the difficulties in the way of complete disinfection of the hands. Having carefully washed them in soap and water, then in an antiseptic solution, and having wiped them upon a towel previously heated to 140°, he plunged them into a sterilized peptone solution; which then became the seat of colonies of bacteria.)

From researches carried on by Von Eiselsberg[1] in Professor Billroth's clinic, upon the various substances used in the hospitals for cleansing the hands, it would seem that the almond powder so freely used in obstetric wards, is tainted with germs, cocci, and bacilli in great variety. Its use should be absolutely forbidden. All soaps are

good, except the ordinary hard (resin) soap; in this Eiselsberg has found many pathogenic spores, whose presence is quite accounted for by the processes of manufacture—the use of impure fats and the low temperature of saponification. The scrubbing with soap and water should be followed by washing in a bichloride solution of 1:1,000. All assistants and nurses should likewise cleanse hands and arms to the elbow in the same thorough manner. Many operators consider this method of cleansing insufficient, and prefer to immerse hands and arms in a solution of potassium permanganate 4:1,000, which stains the skin a violet-brown, then removing the color by a concentrated solution of oxalic acid, and finally washing in water sterilized by means of the Chamberland filter. I believe that this method may be reserved for the exceptional cases where there has been contact with material which is septic or suspected of being so. Fürbringer[2] advocates the use of alcohol at 90° as a wash for the hands, in addition to the soap and bichloride. This process has been accused of making the fingers stiff and diminishing their tactile sensibility.[3] I do not use it.

Where one is obliged to handle fetid substances, as in uterine cancer, etc., the use of deodorizers may well supplement but not replace antiseptics. Without them, the hands become impregnated with a disagreeable odor which clings in spite of thorough washings. Foulis, of Edinburgh, finds that anointing them before the operation with spirits of turpentine is a sufficient protection.

A vessel containing a 1:1,000 bichloride solution should be placed at the side of the operator, so that he may from time to time dip his hands in it.

The operator and his assistants should wear over their ordinary garments, a blouse, or linen frock, which must be changed and washed daily. For operations where constant irrigation is used, the surgeon should further be protected by a large apron of waterproof material (see Fig. 1).

B. Instruments.—As far as practicable, the instruments used should be of the simplest possible construction, easily taken apart if composed of several pieces, without cavities or grooves from which impurities are removed with difficulty. For this reason we should exclude slides on uterine sounds, canulated suture-needles, needle-holders with springs, and, in spite of their convenience, the ingenious invention of Jacques Reverdin, needles with movable eyes. Instruments in one piece are the best

The instruments, which immediately after a previous operation should have been immersed for five minutes in boiling water and carefully wiped, must again be boiled just before the next operation, and then placed in a strong (5%) carbolic solution. Five minutes' immersion in boiling water is sufficient to destroy all germs, as has been proved by H. Davidson[4] in his culture experiments. The bichloride solution cannot be used on account of its destructive action upon metals. Should the instruments have been previously used upon septic material (fetid pus, sanious or gangrenous matter, etc.), these precautions will be insufficient. They must then be immersed for a half hour in a strong (5%) carbolic solution held at the boiling point, or kept for an hour in a sterilizing oven at 284° F., or soaked for twelve hours in a strong cold carbolic solution. These processes have a deleterious effect upon the instruments, especially the bistouries, but they are nevertheless indispensable.

C. Surroundings. Operating Room. Furniture.—It is important that the room used be perfectly clean, and free from curtains, hangings, mats, carpets, etc., which might retain dust. In a private house, whatever room is used for any important gynæcological operation should be emptied of its furniture and thoroughly cleaned; in a hospital, it is essential that the floor, walls, and ceiling of the operating room should be so constructed that they may be washed daily with the hose. Moreover, it is well to have sterilized water and antiseptic solutions in jars with long tubes that may be easily reached. In Fig. 1, I show the arrangement which I have adopted for this purpose in the hospital of Lourcine-Pascal. It is advantageous to have, in addition to a high and wide window at the side, free ingress of light from above. The furniture should be as scanty as practicable, and exclusively of glass or metal, easily movable and easily cleaned. Fig. 1 shows several examples of this style of furniture.

D. The Patient. Antisepsis of the External Genitals.—The patient should have had a complete bath (preferably of bichloride) the evening before or the morning of the operation. The rectum, however small a share it has in the operation, should have been carefully emptied by an enema and afterward washed with a saturated solution of boric acid (50:1,000). The catheter should be used by the surgeon or an assistant previous to the disinfection of his hands. In all operations upon the vulva, the pubic hairs must be shaved, to add to the ease of the operation, as well as to remove a possible lodging place for septic material.

The external genitals should be cleansed first with soap, water, and a brush, then washed with a 1:1,000 bichloride solution. The vagina may be washed with the same solution diluted one-half with warm water.

In my opinion, there is no objection to the 1:1,000 bichloride solution as a vaginal injection, providing that it is administered under the conditions, and according to the directions, to be given below. The biniodide of mercury has been recommended, but it does not seem to offer any great advantages.[5] Pinard and Bernardy use a solution of biniodide 1:4,000 instead of a sublimate solution 1:1,000. The use of bichloride in gynæcology and especially in obstetrics has been much decried of late. Certainly at first it was used in too strong solutions and with too little care, but the reaction has reached the other extreme. The papers published upon this subject have not always taken into account the radical difference between injections given immediately after labor, and those administered under other conditions. In the woman recently delivered, the vaginal and uterine cavities communicate through a more or less gaping and softened cervix. Fluid injected into the vagina, especially if one be not careful to separate its walls with the fingers, flows readily into the uterus, accumulates and remains there, and is perhaps absorbed by the relaxed mucosa, or its desquamated surface. Hence the accidents noted after simple vaginal injections,[6] which have been observed not only after the use of bichloride, but after carbolic solutions. I would here point out a danger attending the use of aqueous solutions prepared upon the spot by diluting concentrated solutions of carbolic acid; more especially if the preparation be impure, small oily drops may form which dissolve with difficulty, and, as a consequence, the injection, instead of being a perfect solution, is in reality a toxic mixture. This is the explanation of cases observed by Briggs,[7] serious accidents resulting from the administration of an injection of a teaspoonful of the alcoholic solution of carbolic acid in a pint of water, to women recently delivered. It is equally certain that the intra-uterine injection of a too powerful bichloride solution (1:1,000) may be dangerous even in non-puerperal patients, as in the case quoted by Mijalieff, where such an injection, given daily for twenty-six days, for simple metritis, resulted in a mercurial nephritis with hæmaturia. I purposely omit allusion to the experiments upon the vaginæ of female rabbits and Guinea-pigs, which do not seem to me to have a bearing upon this special point. Moreover, one should keep in mind the fact

NORTH END OF OPERATING-ROOM IN GYNÆCOLOGICAL DEPARTMENT, JOHNS HOPKINS HOSPITAL, BALTIMORE.

JARS FOR BANDAGES AND TOWELS.

STEAM STERILIZER.

DRAIN FOR INSTRUMENTS AND GLASSWARE.

INSTRUMENT TABLE.

PORCELAIN BATH FOR WASHING INSTRUMENTS.

PLATE I.

SOUTH END OF OPERATING-ROOM IN GYNÆCOLOGICAL DEPARTMENT, JOHNS HOPKINS HOSPITAL, BALTIMORE.

INSTRUMENT CASE.

LAPARATOMY TABLE WITH OVARIOTOMY PAD IN PLACE AND FOOT-REST EXTENDED.

CARRIAGE FOR INSTRUMENTS.

PLATE II.

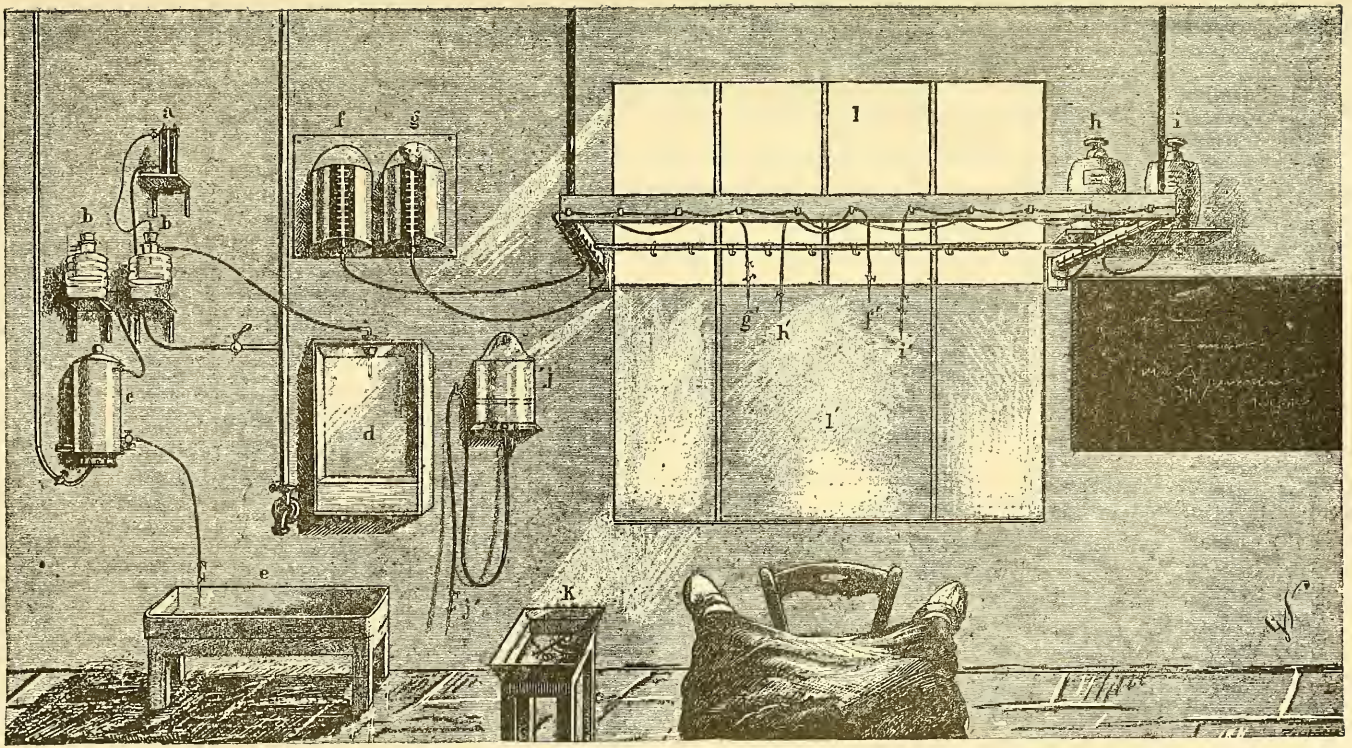


FIG. 1.—GYNÆCOLOGICAL OPERATING ROOM OF THE LOURCINE-PASCAL. 1, Large glass window behind the operator; the upper portion (1) is transparent, the lower (1′) is ground glass and may serve as a board for demonstrations; above the operating table is a large sky-light; *a*, Chamberland filter; *b b*, glass vessels for receiving the filtered water; *c*, Boiler heated by gas; *d*, large reservoir receiving the overflow of filtered water from the receptacles (faucets and overflow not shown, so as not to obscure the view); *e*, sink; *f*, reservoir for boiled and filtered water, to which has been added 6:1,000 of salt; *g*, reservoir for carbolic solution, 20:1,000; *h*, reservoir for sublimate solution, 1:1,000; *i*, reservoir for sublimate solution, 1:5,000; *j*, reservoir for sterilized water, containing 1% of carbolic acid, for continuous irrigation; *f′*, *g′*, *h′*, *i′*, tubes with faucets leading to the respective reservoirs; *k*, porcelain pan mounted on legs for instruments.

that the bichloride solutions commonly employed are very rapidly neutralized by contact with abundant secretions, leucorrhœa, cancerous ichor, etc., and lose both their toxic and disinfecting power. Ernest Laplace[8] has recently shown the instability of this antiseptic, and has investigated the cause and its remedies. The mercurial salt is precipitated by albuminoid matter, forming albuminates, whence the rapid loss of antiseptic power. The following are a few of his experiments: To an open tube containing a little less than an ounce (25 cc.) of natural serum, is added about a drachm (5 cc.) of sublimate solution 1:1,000; the development of germs is not prevented; with 7 minims of serum bacteria are present. In a tube containing a drachm of sublimate solution 1:1,000, with about 12 minims of putrefied human blood containing bacteria, the microbes multiply; if a few drops of this mixture are cultivated on gelatin according to Esmarch's method, at the end of five days we shall find large colonies of the staphylococcus aureus. Laplace has found that the addition of 5:1,000 of tartaric acid to the solution is sufficient to prevent the formation of the albuminates of mercury, without impairing its power to destroy every germ present. This discovery, most valuable for general surgery, may also be utilized in gynæcology. From my own experiments, I have nothing but praise to award it.

I must say a few words about a new antiseptic, creolin, which has recently appeared, and has been experimented with in gynæcology and obstetrics by Baumm and Born[9] in the Maternity and Obstetrical Clinic of Breslau. As a result of their researches, it would seem that creolin possesses certain decided advantages, but also certain drawbacks which tend to greatly limit its usefulness. It is extremely difficult to obtain a fixed product, its exact chemical composition not having as yet been determined. It is used in solution of ½:100 in treating ruptured perineum, fissured nipples, etc. If more concentrated, it may produce erythema, or eschars, so that as an antiseptic it would seem to be inferior to a 1:8,000 bichloride solution (Baumm). For intra-uterine injections Born has used a 1:100 solution, for vaginal irrigations 2:100, with no resulting accident due to absorption. Besides its undoubted antiseptic power, creolin possesses the great advantage of leaving the vagina soft and flexible, and even of imparting to it a degree of oiliness which is of decided advantage in obstetrical operations, and in certain gynæcological manipulations when several fingers have to be introduced into the vagina, or where a large tumor is to be extracted through it (enucleation of fibroid bodies, vaginal

hysterectomy). We know that solutions of the bichloride of mercury and even those of carbolic acid have the opposite effect of stiffening and roughening the vaginal mucosa, leading often to serious inconvenience. This is, I believe, the only useful application of creolin. The opacity of the solution renders it unfit for the immersion of instruments.

Naphthol β, used by Bouchard for intestinal antisepsis, has been recently extolled for surgical dressings, either in solution or as a saturated gauze.[10] It has the advantage of being very slightly poi-

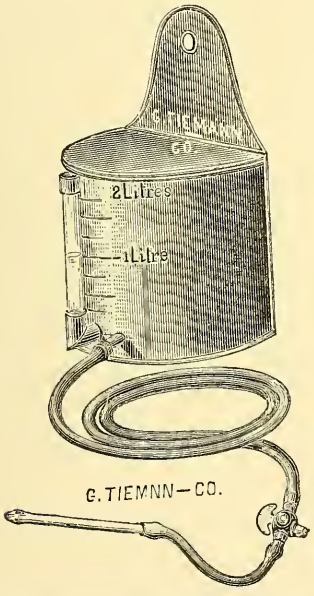


FIG. 2.—VAGINAL IRRIGATOR FOR SUSPENSION.

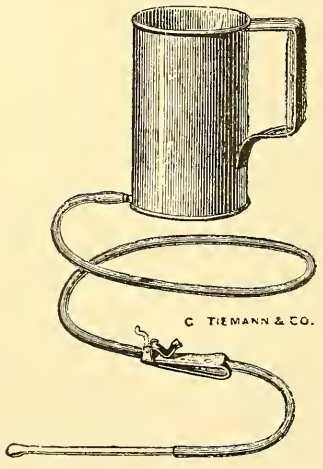


FIG. 3.—PORTABLE VAGINAL IRRIGATOR.

sonous, and seems destined to render real service. The aqueous solution contains only two parts in a thousand.

Vaginal injections, to be truly cleansing, should be given according to certain definite rules. A portable cylindrical can, to which is attached a long tube ending in the nozzle (Figs. 2 and 3), should be fixed at a slight height above the operator, or held up by an assistant. The person who gives the injection places the canula in the vagina, introducing by its side the index and middle fingers, which are gently pushed up to the cul-de-sac, then firmly pressed in every direction to open out the folds of the vagina and permit of their thorough cleansing. If this procedure be neglected, some cause of infection will

surely remain. The surgeon or his assistant should himself give such an injection before an operation; it is what I call rinsing the vagina.

All canulæ to be used by the surgeon should be of strong glass with one terminal orifice, for the water should be directed toward the cul-de-sac and the cervix, cleaning the vagina upon its return only.

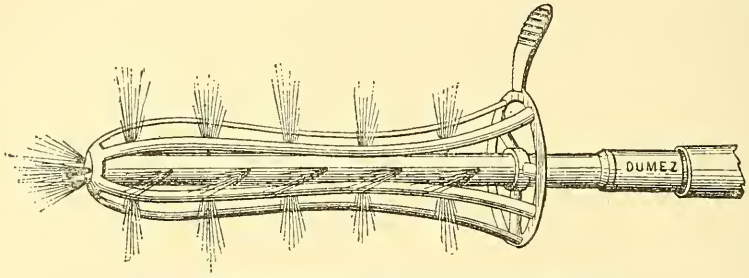


Fig. 4.—Fenestrated Speculum for Vaginal Irrigation.

For injections to be administered by the patient herself, it is best, to avoid all possibility of introducing the tube into the os uteri, to have a canula with several openings on the side of a terminal enlargement. It is also a convenience to use a wire speculum, which accurately fits the canula, and which opens out the vagina and permits of thorough irrigation (Fig. 4). The patient should lie upon a pan or a rubber sheet arranged to carry the fluids into a pail (Figs. 5 and 6).

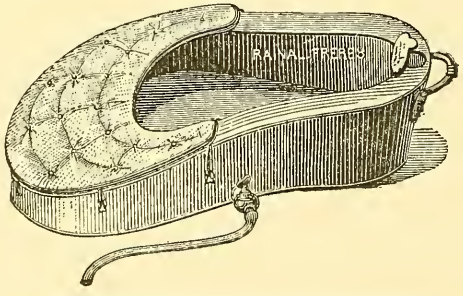


Fig. 5.—French Bed-pan with Exit-tube.

The accidents liable to occur from vaginal injections and the danger of wounding the cervix or allowing liquid to enter through it, have been greatly exaggerated. Some physicians have even gone so far as to forbid the use of the canula. This is, I think, a grave error. You should simply instruct the patient to insert the instrument to a depth of six to eight centimetres (three inches) only, or about a finger's length.

Rubber canulæ, which are not easily cleaned and disinfected, should be discarded.

Curved canulæ possess no advantage over straight ones.

During the week preceding the operation, the patient should take an antiseptic injection (sublimate solution, 1:2,000) morning and evening; after which a small pad of iodoform gauze is to be inserted in the vagina. On the day of the operation three injections are to be given, the first two at intervals of an hour, the third at the very moment of the operation; I will point out later the reason for this method of procedure.

After a vaginal injection, especially of corrosive sublimate, one should be careful to press down upon the fourchette in such a manner as to insure the escape of all the fluid. In many women, the terminal

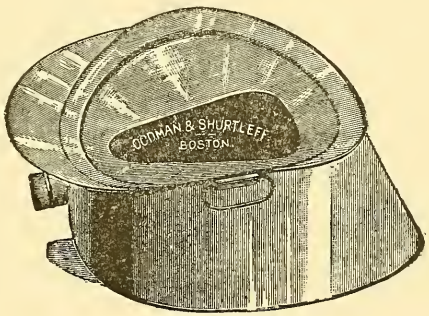


Fig. 6.—Hospital Bed-pan (or Baker's Bed-pan).

portions of the vagina and the vulva are of so firm a quality that much fluid may remain imprisoned in the upper part of the canal, and give rise to the various accidents due to absorption. I have myself witnessed several minor casualties due to this cause.

There is a wide-spread opinion that an antiseptic injection should follow and not precede minor gynæcological procedures—as examination, catheterization, dilatation, etc. This is a grave error. Antisepsis is most needed before any such manipulation. The observations of Kaltenbach[11] upon the auto-infection of parturient women might have caused a suspicion of the existence of a condition of latent infection, so to speak, of the female genital organs, especially during the puerperal period. The researches of Winter[12] have recently placed this fact beyond dispute. The genital tract, vagina, and cervix uteri of a healthy woman, contain pathogenic germs; the Staphylococcus pyogenes aureus, citreus, albus, and streptococci of

three varieties have been recognized by their several distinct characteristics and methods of culture. But, and most important, their virulence seems to be attenuated and latent, since the inoculation of animals with these germs and their cultures has been without result. Notwithstanding this, they are a perpetual menace, for these inert organisms may, at the slightest septic impulse from without, germinate and fructify with the most terrible consequences. Moreover, there is no proof that these germs, innocuous so long as they remain in their ordinary habitat below the orifice of the internal os uteri, may not reacquire virulent properties if they are suddenly carried beyond this boundary. That germs may be carried into the uterus by the use of the sound and by manual touch has been proved beyond a doubt by Winter's examinations of specimens removed by hysterectomy shortly after these operations. The consequences of these remarkable experiments are important. As regards the disinfection of the vagina prior to operation, they make its necessity apparent. Is it possible, by means of the most carefully administered injection, to get entirely rid of the micro-organisms quartered in the cervix? Steffeck[13] has made a particular study of this subject, from which he draws the following instructive conclusions:

1. After a vaginal injection of one litre of a 1:3,000 sublimate solution, as many germs as before are found in the cervix; only the vagina has been cleansed:

2. After the same injection, in which the vaginal washing has been done with the aid of one finger as described above, if some of the vaginal mucus be inoculated upon agar-agar, a number of colonies will develop, less numerous, however, than in the first case.

3. After the same performance aided by two fingers, two of every three cultures will remain sterile.

4. As a final experiment, the injection of the vagina and the cleansing of the cervix are accomplished in the following manner: One finger is pushed as deeply as possible into the cervix; another finger opens and permits a thorough washing of the anterior cul-de-sac —then the two fingers are changed about in such a way as to cleanse the posterior cul-de-sac; finally the stream of water is sent directly into the os externum. After so thorough a washing as this, all culture experiments have been without result, while before this disinfection, the tube cultures showed from 50 to 100 colonies. As might be expected, this disinfection is of short duration, as more germs come from the supra-vaginal portion of the cervix through the os

uteri, and at the end of an hour may be found in the lower portion of the cervix. By repeating the injection for a second, and then a third time at intervals of an hour, the germs may be destroyed for a longer time; Steffeck having found that in such a case the mucus was free from germs for five days.

This process of successive sterilizations is somewhat tedious, but it reduces to a minimum the chances of auto-infection. This is the reason why I recommend the administration of three consecutive injections at intervals of an hour, previous to every operation. No sound or dilator should ever be introduced into the uterus, without this thrice repeated disinfection of the vagina and cervix.

To the omission of this precaution may be traced the numerous accidents following these operations even when they are apparently done under strict antisepsis. If we have to do with a disease causing a foul odor, as cancer, sloughing fibroid, etc., the antiseptic should be preceded by a deodorizing injection (which is at the same time in itself slightly antiseptic) of a quart of hot water to which are added two or three teaspoonfuls of Labarraque's solution of chlorinated lime or Pennès' vinegar. To wash the rectum and the bladder, use either a solution of boric acid (30 : 1,000) or of salicylic acid (1 : 1,000), both of which are non-irritating to the mucous membranes.

For dressings, iodoform gauze should be used almost exclusively. That which we ordinarily obtain as an article of commerce is supposed to contain from 10 to 30% of iodoform. Where large amounts are needed, it is more economical and better to have it prepared by some one trustworthy person. Ten yards of plain gauze sterilized by boiling, are cut into pieces of a yard each, soaked in a solution of iodoform (50), glycerin (100), and ether (700), passed through a wringer, hung up in an isolated chamber which is darkened and heated to 85° F., and dried, after which it is placed in tightly-closed tin boxes.

Some curious experiments made by von Eiselsberg[1] in Billroth's clinic, upon supposedly carefully-prepared gauze, demonstrated the fact that it often (eleven times out of thirty) contained germs whose presence was readily shown by means of culture. If the gauze, before the addition of the iodoform, was subjected to a temperature of 212° F. (easily done by boiling it), the cultures remained sterile in the proportion of 18 out of 20. This preliminary precaution of sterilizing should never be omitted.

It would be still better to heat the gauze to 250° F. in a steam sterilizer[14] in order to destroy both germs and spores. But this apparatus

is not everywhere obtainable, and sterilization by means of boiling water, if not theoretically perfect, certainly seems to produce sufficiently excellent practical results.

It may seem surprising that iodoform alone does not suffice to destroy all germs. As regards this point, we must refer to the researches of Heyn and Rosving.[15] They have proved that iodoform in itself is not a germicide, is not even an obstacle to the development of germs. De Ruyter (of Berlin) and Lübbert (of Wurzburg[16]) have come to the same conclusions, which have been further confirmed by the recent experiments of C. B. Tilanus.[17] Shall we conclude that iodoform *in vivo* is not an antiseptic in the presence of pathogenic ferments? Certainly not. The researches of Behring[18] (of Bonn) will give the solution to this seeming contradiction. According to this authority, as leucomaines and ptomaines form, iodoform acts upon and destroys them by a process of reduction. It may be considered as an established fact, that it is not possible to have any dressings which will be absolutely aseptic.[19] You may keep them from all contact with the air in tightly-closed metal boxes (an indispensable precaution, be it noted); but whenever the box is opened the germs may enter. It is better, therefore, to use antiseptic gauze (iodoform) rather than aseptic gauze which has simply been sterilized in a moist chamber. Nevertheless, if sterilization were applicable on a large scale, not only to the dressings, but to all the bedding as well, it would no doubt be all-sufficient. In Bergmann's clinic, where everything is thus carefully purified, the effort is, as far as possible, to replace antisepsis by asepsis, and for this reason gauze which has simply been sterilized is used in many cases as a dressing.[20]

If symptoms of absorption render necessary the substitution of some other substance for iodoform, sterilized and sublimated gauze should be used. This may be easily obtained by first boiling the gauze for an hour in a solution of sodium carbonate 20:1,000, to remove all stiffening, then for an hour in a 1:1,000 solution of bichloride. It is then dried in a sterilizing oven and preserved in tightly-closed boxes or jars.

I have used salol and iodol, and have found them very inferior to iodoform and sublimate. As to carbolized gauze, it so quickly loses its antiseptic properties that it is not to be depended on; moreover, it is slightly irritating.

Antisepsis of the Cervix and Uterine Cavity.—After operations upon the uterus or the cervix, it is well to leave some antiseptic in

contact with the cervical canal. I have used small crayons made according to this formula of Von Häcker:[21]

℞ Iodoformi pulv., . . 20.00 gm. ʒ v.
Gummi acaciæ,
Glycerini,
Amyli, ... āā 2.00 gm. gr. xxx.

M. S. To be made into sticks of the same calibre as the ordinary sticks of nitrate of silver.

These crayons have the advantage of being very manageable, and

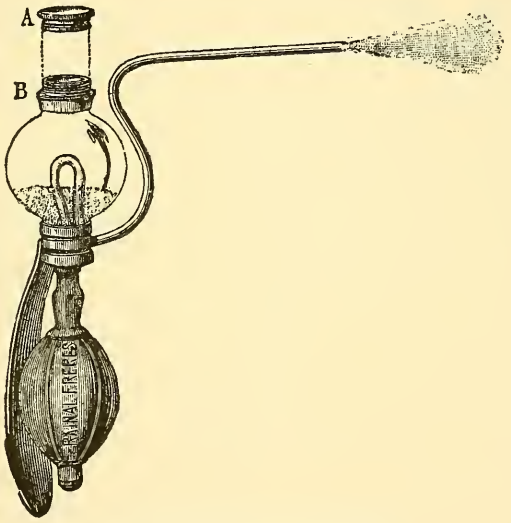
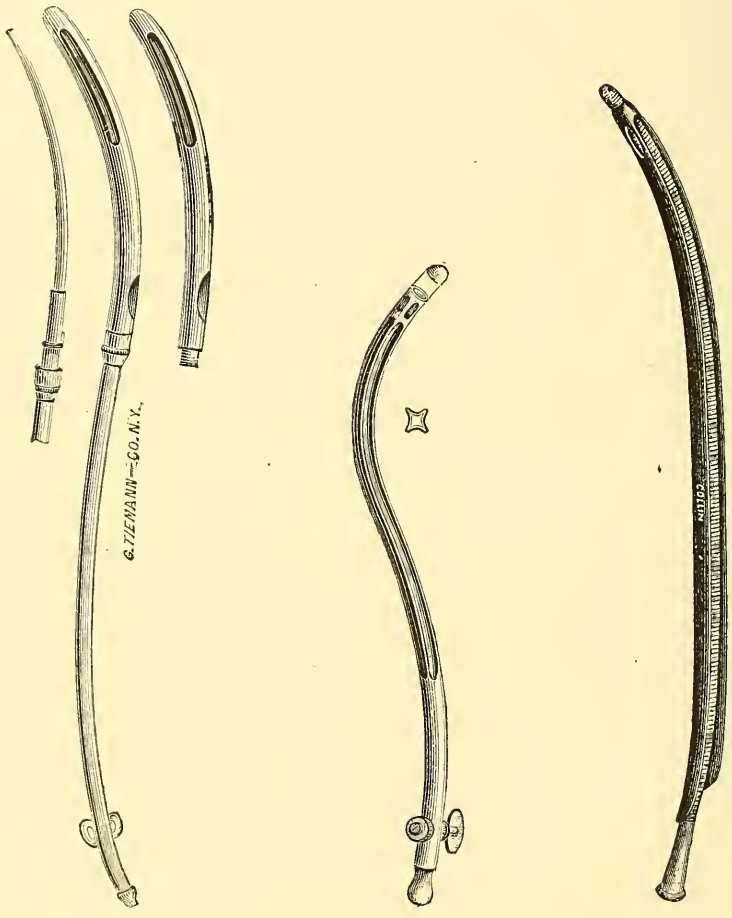


Fig. 7.—Insufflator for Iodoform.

they can be inserted to quite a depth into the uterus; but sometimes (doubtless through some error in their manufacture) they dissolve incompletely, and their presence gives rise to colicky pains. I have therefore abandoned their use, and content myself with dusting iodoform upon the cervix, or blowing it into the cavity by means of a special insufflator (Fig. 7), leaving besides in contact with the cervix a tampon of iodoform gauze.

The disinfection of the apparatus used in dilating the cervix is one of the most important points for our consideration. I do not use tupelo or prepared sponge tents, regarding them as much inferior to the laminaria. This even may be a source of infection if we neglect certain precautionary measures. There are two methods of rendering

it antiseptic; either immersion in a concentrated solution of carbolic acid in rectified spirits, which is the one adopted by Martin; or placing the tents in ether saturated with iodoform, to which it is well to add a tenth part of alcohol (Herff, of Darmstadt; Doléris, etc.). Whichever method be chosen, the tent before using should be rapidly



1. Bozeman-Fritsch's. 2. Oliver's. 3. Collins'.

FIG. 8.—RECURRENT CATHETERS FOR INTRA-UTERINE INJECTIONS.

washed in a solution of carbolic acid 20:1,000 or of corrosive sublimate 1:1,000.

Intra-uterine injections in gynæcology are far from possessing the same danger that they do in obstetrics, excepting where the uterine cavity is much dilated and offers, after an operation, a large denuded surface (enucleation of fibromata, curetting a cancer in the fundus,

etc.). In a case like this, the conditions are very similar to those of a uterus after delivery, so far as the absorptive area is concerned.

When the uterine cavity is not specially dilated (as after curetting for catarrhal or hemorrhagic endometritis), there is no objection to using a bichloride solution 1:2,000, if one has a double-current catheter of hard-rubber, glass, or celluloid. But as most instruments are of metal which is attacked by the mercurial solution, it is better to use a one-per-cent carbolic solution. This must be tepid and one may use a pint or more, until from the appearance of the fluid as it comes from the uterus it can be seen that the cleansing has been thoroughly accomplished. The number of tubes for intra-uterine injections has greatly increased of late. I limit myself to mentioning, without describing, those of Pajot, Budin, Pinard, Militano, Doléris, Segond, and Mathieu. When the uterine cavity is not enlarged, I use the

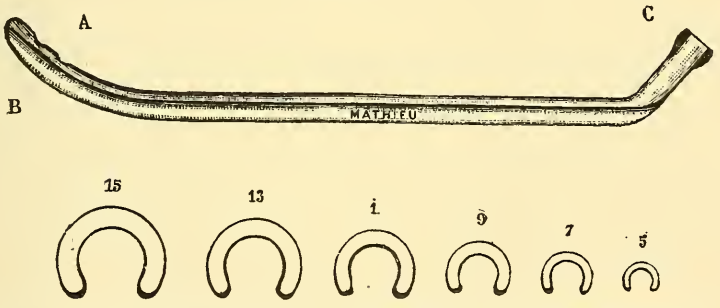


Fig. 9.—Budin's Horse-shoe Recurrent Catheter for Intra-uterine Irrigation.

Bozemann-Fritsch instrument (Fig. 8), after dilating the cervix, if that be necessary. If the uterus is much enlarged, no danger attends an injection given with an ordinary sound or canula, providing that the pressure of water be not too great, as the liquid can easily return around the canula.

Should the cavity of the uterus need powerful disinfection (as in certain cases of gangrenous fibromata, intra-uterine cancer with putrid fungosities, etc.), it would be well to use bichloride 1:2,000; after its prolonged application, it must be followed by a second intra-uterine injection, simply to wash away any of the poisonous antiseptic which might remain. For this purpose I would recommend water sterilized in the Chamberland filter and then boiled, to which I would add 6:1,000 of sea salt; this modifies its irritating and absorptive powers by causing its composition to more nearly approach that of the serum of the blood. I make frequent use of this fluid for injections

that are to be purely aseptic, whenever, for any reason, the use of antiseptics is contra-indicated.

Before leaving the subject of the antisepsis of the external genitals, the vagina, and the cervix, I would say a word in reference to a procedure which is at the same time an adjuvant in an operation and a method of disinfection. I refer to continuous irrigation. It may be accomplished by means of a special speculum (Fig. 10), or more simply

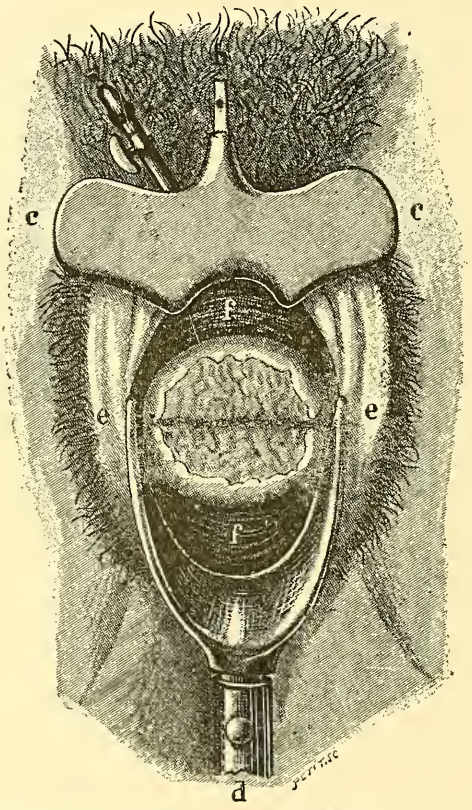


Fig. 10.—Showing how Continuous Irrigation during Operation may be Maintained by Fritsch's Device. *a*, End of irrigating canula to which rubber tube is to be attached.

by the help of a long canula which one of the assistants must grasp in his hand, supporting his wrist upon the pubis, while in the same hand he holds another instrument (a retractor or a tenaculum, Fig. 11). I use for this irrigation carbolized water (10:1,000), at 95° to 115° F. Its strength must be diminished to 5:1,000 if the irrigation lasts for any length of time, otherwise painful excoriations will be the result. The slender stream of water which constantly flows upon the

operating field, and can be increased or diminished at will, has a two-fold advantage: it washes away the blood, thus dispensing with the necessity of sponges or their substitutes, and it keeps the wound bathed in an antiseptic fluid which is a far better protection against the germs in the atmosphere than even the spray. In all operations upon the vulva, vagina, and cervix, the use of continuous irrigation is to me a matter of routine practice; I can scarcely praise it too highly.

Sponges I never use, as I consider pledgets of absorbent cotton,

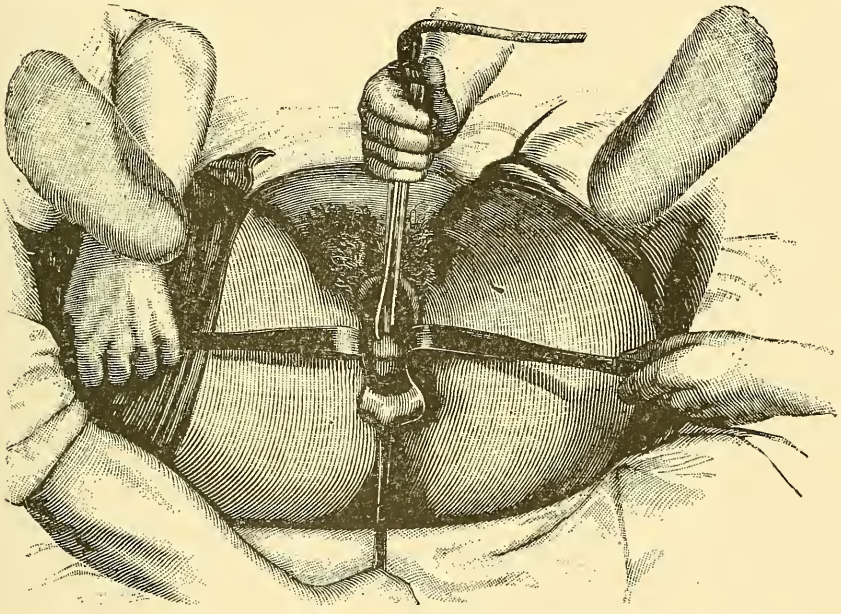


Fig. 11.—Continuous Irrigation with a Long Nozzle; also Shows Position of Assistants.

either dry or soaked in a bichloride solution, which is then squeezed out, to be far superior. If used dry, it is well to wrap each in gauze.

Laparatomy.

I will now take up the special antiseptic precautions which are to be used in a laparatomy.

A serious preliminary point arises: How does it happen that operators of great authority, as Lawson Tait and Bantock, for example, disapprove of antisepsis, regarding it as useless and even dangerous, and, in spite of this opinion, obtain the most superb results ?[22] Does not this fact greatly impair the value of the minute precautions which we are about to advise ?

The contradiction is more apparent than real, and to convince yourself of this it is only necessary to follow in detail the methods of procedure adopted by these operators whom I have quoted. You will see that if they cannot be called antiseptic, they are eminently and to an extreme degree aseptic.[23] Now for a laparatomy and all intra-peritoneal operations, asepsis is not only equal but far superior to antisepsis. In fact, considering the delicacy of the endothelium lining serous cavities, an antiseptic solution strong enough to exert any action would injure this tissue and perhaps be followed by results which would endanger the success of the operation. Rigid asepsis, then, should be the rule for the interior of the abdomen, antisepsis being reserved for the exterior.[24] If, moreover, you will note the fact that after a laparatomy and the accurate fitting together and suture of the abdominal walls, there is, so to speak, no longer any wound, you can understand why the omission of antiseptics in the dressings may be unattended by untoward results. Notwithstanding all this, I consider such omission to be an error.

A. The operator and his assistants must be absolutely clean. For forty-eight hours previous to the operation, none of them should have been in a dissecting room, nor present at an autopsy, nor have handled an anatomical specimen or septic wound.

On the other hand, they should have taken either a vapor or bichloride bath, followed by vigorous friction and soaping of the whole body.

A long and perfectly clean linen garment should cover their ordinary clothes. The hands and arms should be disinfected according to directions given above. After these ablutions they must be careful to touch nothing which has not been disinfected, nor to shake the hand of any friend. If necessary, one may wear gloves which have been sterilized by heat until the very moment of the operation.

The number of assistants should be as restricted as possible in order to diminish the chances of infection. One is usually sufficient for the operation itself; a second to prepare and hand sutures and ligatures. The surgeon himself will take his instruments from the receptacles where they are lying in an antiseptic solution.

No one should operate upon the abdomen if there be the smallest sore or suppurating scratch upon the hands, for no rubber finger shield can fully protect the peritoneum from possible infection.

B. The patient has on the previous evening been given a soap or sublimate bath. For several days she has had, night and morning, a

vaginal injection of bichloride 1:2,000, after which a pad of iodoform gauze has been placed in the vagina. The bowels have been emptied by a purge the day before, and by an injection in the morning. An assistant uses the catheter, and immediately disinfects his hands. The hairs are shaved, the abdomen is washed with soap and water with a brush, then with ether, and finally with bichloride 1:1,000, taking especial care to clean the cutaneous folds of the umbilicus. The abdomen is then covered with compresses saturated with sublimate solution, and these remain in place for the time, however short, which elapses between the cleansing and the operation.

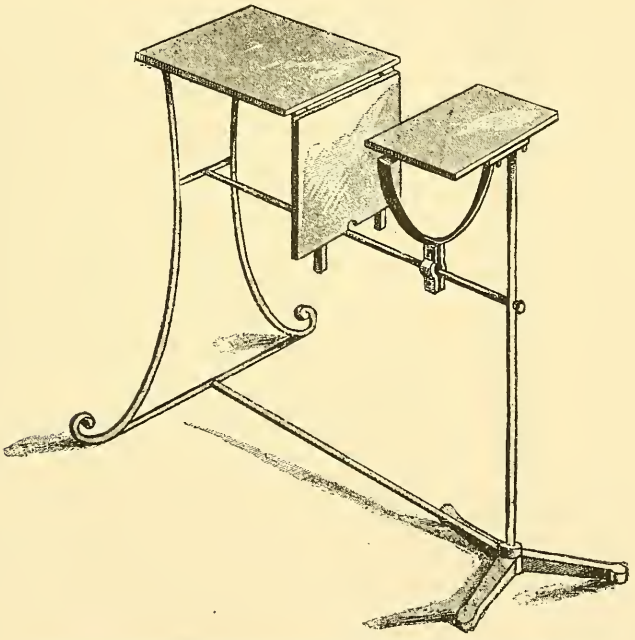


Fig. 12.—Laparatomy Table of Mme. Horn, Employed by Martin.

C. In a hospital, a special room is reserved for laparatomies. It is as far as possible from the wards in which are patients with suppurating or septic wounds, from the water closets, and, in short, from all sources of infection. The corners should be rounded off; there must be no recesses or places not easily accessible for cleansing purposes. All the furniture should be movable; seats, tables, stands, should all be of metal, enamelled or varnished, or of glass. After each operation, the wall should be washed with a hose attached to a pump, or to a faucet which admits the water with sufficient force to send it to the most remote corners.

Should the operation not be performed in a hospital, the room chosen should be carefully prepared at least two days in advance. The furniture must be removed; if the walls have not been newly whitewashed, they must be carefully cleaned, as well as the ceiling, floor, and woodwork, with cloths soaked in a carbolic solution 50:1,000. If the house be old, or the room under suspicion, this

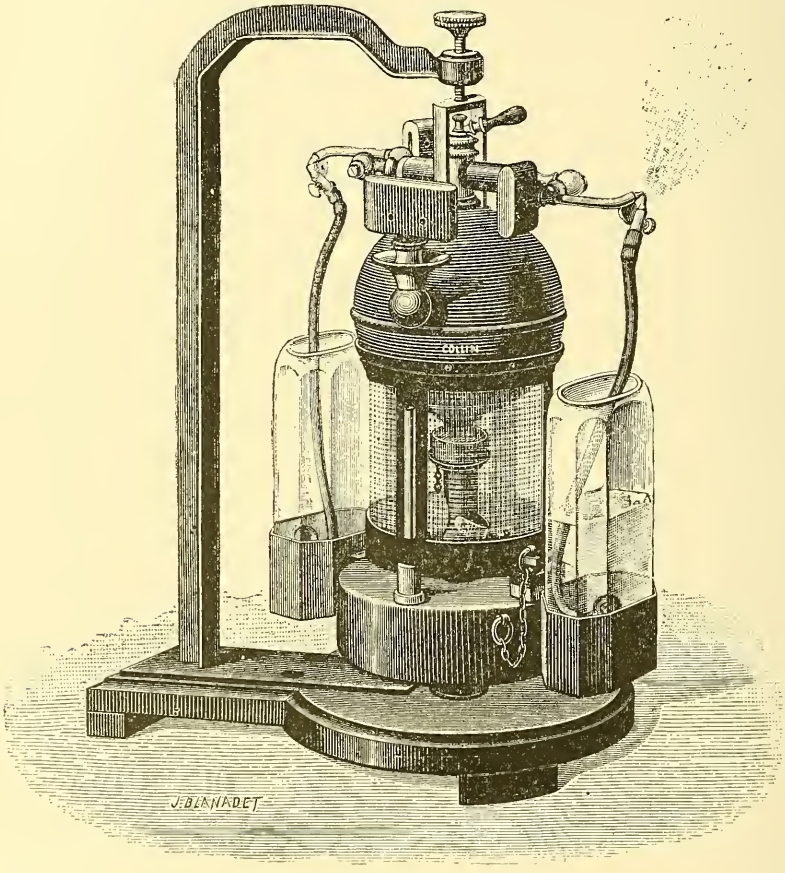


Fig. 13.—Collins' Rotary Atomizer.

cleansing should be supplemented by a disinfection with sulphurous acid—placing some sulphur (two pounds to each 1,000 feet) upon a dish in the middle of the room, setting fire to it, and hermetically sealing the openings to the chamber during twenty-four hours.

During the whole of the operation the temperature of the room should be high, in order to avoid all chilling of the patient *intus et extra*. From 77° F., at least, to 86° F., at most, is necessary. That

this be not a dry heat—which would be harmful to the exposed viscera—the atmosphere should be saturated with the vapor of carbolized water by means of an atomizer. This spray should not be directed upon the operating field, as used to be done in the early days of Listerian antisepsis and as many operators still persist in doing. The stream of vapor should be directed to the middle of the room with an upward and downward motion. The only result to be aimed at is the saturation of the atmosphere. As soon as this is accomplished, the process is stopped, and repeated only if the length of the operation renders it necessary. Collins' revolving atomizer perfectly meets the conditions. A spray constantly directed toward the patient is more injurious than useful; it chills and irritates the peritoneum, to say nothing of the dangers of intoxication.[25]

Instruments.—These should have been cleaned and immersed in boiling water for five or ten minutes after the preceding operation. On the day appointed for the laparatomy, they are to be placed for an hour in a sterilizing oven at 250° to 290° F. (Fig. 14), then dropped into the carbolic solution 50:1,000. Cutting instruments subjected to this process quickly deteriorate, and need to be constantly sharpened.

I strongly recommend the operator to use his own and never borrowed instruments, since you can only feel perfectly secure in regard to the disinfection of the former. Better a disinfected bistoury that is dull, than a sharp bistoury capable of infecting the patient.

For the same reason I have given up the use of sponges. It is not always easy to obtain new and perfectly purified sponges, nor need we wonder at this when we recall the elaborate preparations which they must undergo before they can be called clean.[1] Sponges which have already been used require even more scrupulous purification, and are less to be trusted, because of the septic fluids which may have contaminated them. So that sponges are both unreliable and expensive. It may surprise you that I should mention expense as worthy of consideration, but in a hospital it should be taken into account. Finally, it often happens, especially in places remote from the centres of trade, that one has at hand only sponges which are too rough to use, or too easily torn, of an inconvenient size or shape, and quite unmanageable. Having been a witness in Billroth's service in Vienna to the advantages offered by the antiseptic gauze-sponges, I use them to the exclusion of all others. This is my method of preparing them: a piece of gauze is folded several times in such a way as to make pieces twelve inches square, composed of eight thicknesses

of the gauze. These compresses are hemmed at the edges, and then boiled for at least two hours in either a carbolic solution 50:1,000 or bichloride 1:1,000. They are then kept in fresh solutions of the same composition, which should be renewed weekly. When you wish to use these compresses, they are to be carefully washed in water sterilized by filtration and boiling, and then wrung out. They now constitute a powerful and convenient means of absorption, which can quickly assume any shape or size, which can cap the finger to penetrate into cavities and interstices, which can be spread out upon the intestines, in short, which are in every way superior to sponges. During an operation, a compress may, if necessary, be used more than once, after washing it. Those which have been soiled by septic fluids are thrown away. After an operation all are destroyed—a process fully justified by the low price of their manufacture, but which often seems an extravagance in the case of sponges. About three years ago, I first introduced the exclusive use of gauze-sponges for laparatomies, and detailed their advantages in a report to the Surgical Society, October 19th, 1887 (*Bull. de la Soc. de Chir.*, Vol. XIII., p. 576). Terrillon has recently followed my example by extolling their merits; Harteloup has also adopted them. I feel sure that any opposition to them will be of short duration, and that they will soon be in general use.

As regards the antiseptic procedures forming a part of the operation itself, I shall content myself with a brief examination of them, since I shall return to the subject under the head of each special operation. I shall here mention only those of particular importance.

Care of the Peritoneum.

Laparatomists have long pushed to an extreme the care taken to clear away all discharges and clots of blood from the peritoneum. They have greatly exaggerated the noxious action of these residua, which are very likely to be reabsorbed if the absorptive powers of the serous membrane are not destroyed by lotions and untimely rubbings. One should be very cautious in the care of the peritoneum [27] and try to avoid the necessity for much dressing by preventing the overflow of the contents of tumors. Where this is not possible, the cleansing should be rapidly accomplished by means of the gauze-sponge. According to many authorities, some fluids which have the reputation of being very infectious, as the contents of cysts and the

pus from a pyo-salpinx of long standing, are really less dangerous than has been supposed.

Flushing the peritoneum with warm sterilized water (to which I add 6 : 1,000 of sodium chloride) was first extolled by Lawson Tait, and is chiefly of use where an irritating or infectious fluid has come in contact with the serous membrane during the operation; but it should not be used to wash away the blood, as this can be accomplished perfectly well by means of the gauze-sponges. Although it is certainly a serious matter to leave the least drop of pus or the smallest septic particle in the peritoneal cavity, the case is not the same with small clots which are easily absorbed. There is another indication for these hot-water flushings to which I will make only a passing allusion. They have been much praised for the counteraction of shock [28] following an operation. Polaillon [29] has recently pointed out the danger attending the administration of washings of too high a temperature upon the supra-umbilical portion of the peritoneum in the vicinity of the solar plexus; they may cause an arrest of respiration and syncope. As for pelvic washings, they are not harmful when performed rapidly and with some harmless fluid which can be absorbed without danger. However, the experiments of Delbet [30] have proved that these washings temporarily impair the absorbing powers of the peritoneum—a fact which should be kept in mind if there is any fear of secondary oozing, as it may render drainage necessary.

Water filtered through the Chamberland filter may still contain microbes, as Tripier [31] has shown, and we know that simply boiling it kills the germs but not the spores. Certainly water which has been filtered and boiled is fairly pure and may be used without much fear. But to insure absolute security the temperature must have been raised to 250° F. This is the method recommended by Tripier: a glass flask is provided with two short tubes which pass through the cork—one of these tubes has an enlarged end, which is filled with cotton to filter all the air admitted to the receptacle. The second glass tube is adapted to a rubber tube with a pinch-cock. The flask is partly filled with water, which must not be reached by the tubes, and heated to 250° F. in the Chamberland steam sterilizer. The flask is removed and the rubber tube adjusted, and one has only to tip up the flask to regulate the flow of water.

I propose a method which is still more simple, and for which one can use an ordinary sterilizing oven. A long-necked flask is partly filled with water, which is then boiled, and as soon as all the air is

displaced the neck is closed by fusion over a lamp flame. The flask can now be placed in an ordinary sterilizer and submitted to a temperature of 250° F. without fear of seeing all the water pass away into steam, which would be the case had not the neck been sealed. [As the tension of aqueous vapor at 250° F. is about two atmospheres, the evident danger of exploding the flask must be kept in mind. Practically, carefully filtered and boiled water is sufficiently aseptic.] The flask can then be kept as it is, or the neck broken and filled with a cotton tampon to filter the air and render it innocuous. A number of flasks can be prepared and kept ready for use. To this perfectly pure water can be added salt in the proportion of 6:1,000, and it is now ready for use in washing the peritoneum, or for injection into the veins in case of threatened death from hemorrhage—a means which has largely taken the place of the old-fashioned transfusion of blood. The cauterization of wounded surfaces, pedicles, and adhesions has been done by means of antiseptics such as a concentrated solution of carbolic acid, the tincture of iodine, iodoform, or with the actual cautery. The last-named process was introduced by Baker-Brown, and is much in vogue in England and America. For my part, I often use it where a cut surface has a suspicious appearance (as in some salpingotomies) or is merely thick and moist. Be it understood, I speak in this connection only of the antiseptic powers of cauterization, which it is important to keep separate from its hemostatic properties, so valuable in parenchymatous oozing. Paquelin's thermo-cautery has, with us, taken the place of Baker-Brown's red-hot iron. A strip of iodoform gauze should be wrapped about the handle of the instrument in order to prevent the hands from becoming soiled by contact with it.

Preparation and Preservation of Materials Used for Ligation and Suture.

The subject of antisepsis in gynæcology would be incomplete without a section relating to the preparation and preservation of the various materials used for ligatures and sutures.

Silk.—The strongest with the least bulk is the flat braided silk, of which six different numbers are obtainable. It is to be arranged in very loose skeins to insure a perfect disinfection of every part, boiled in a carbolic solution 50:1,000, wound upon glass reels and immersed in a fresh carbolic solution of the same strength, which is to be changed every week. It is well not to prepare too much silk at a

time, for it is most reliable immediately after the boiling. Hegar uses an iodoform silk. He immerses it for twenty-four hours in iodoform ether (20 grams iodoform to 200 grams of ether), dries it, winds it on bobbins, which are dusted with powdered iodoform and kept in glass boxes. Silk may also be rendered antiseptic by boiling in a bichloride solution 1:1,000. Nilsen[32] suggests that wherever silk is to be used for sutures or ligatures exposed to the action of the air, it should be boiled in wax and carbolic acid; this would render it impermeable and aseptic at the same time.

For my part, in laparatomies, I prefer to use the carbolized silk, with which there is less risk of inducing symptoms of poisoning where one is obliged to use many ligatures and to leave them in the abdomen. Some enfeebled patients are peculiarly susceptible to mercurial poisoning.

Catgut.—In preparing catgut, I have obtained the best results with the oil of juniper wood (oleum ligni juniperi) which must not be confounded with the oil of juniper berries. This was first recommended by Thiersch and then adopted by Küster, Schröder, Martin, Hofmeier, etc. Kocher found by experimentation that this oil sterilizes violin-string in twenty-four hours (Troisfontaines, "Manuel d'Antisepsie Chirurg.," p. 100). This same surgeon has, however, lately decried the use of catgut, holding it responsible for septic accidents occurring in his clinic. It seems likely that Kocher was supplied with a bad quality of catgut, and that his condemnation is too sweeping.[32] After keeping the rolls of catgut for an hour in an aqueous solution of bichloride 1:1,000, I put them into the oleum juniperi for at least eight days; they are then removed and preserved in rectified spirits to which is added a tenth part of the juniper oil. Just before using the catgut is put into watery sublimate solution, which swells it a little but renders it very flexible. Martin's process varies slightly from this. The catgut is rolled on the glass reels, immersed for six hours in the one-thousandth solution of sublimate, withdrawn, dried by pressing in a towel, and placed in a mixture consisting of two parts alcohol and one part oleum juniperi. This may be used with perfect security after a delay of six days. During the operation the amount to be used is kept in a basin filled with some antiseptic solution. In the Frauenklinik in Berlin, the catgut is left for twenty-four hours in oil of juniper, then for twenty-four hours in glycerin, and finally in absolute alcohol to which is added a small amount of the oil.

The advantages possessed by catgut prepared in juniper oil are many; it is far superior to that more commonly used which is disinfected in carbolized oil; it possesses remarkable tenacity and flexibility; it may be used for buried sutures, as it is dissolved and absorbed in a length of time proportunate to its bulk, which, by the way, should be carefully noted by the operator. It is because of these qualities possessed by catgut that buried sutures and sutures in layers

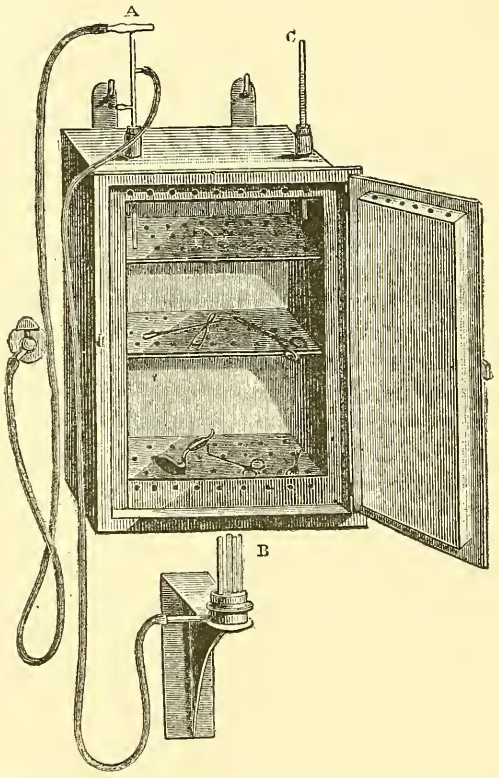


Fig. 14.—Wiesnegg's Sterilizing Oven. *A*, Regulator; *B*, burners; *C*, thermometer.

have been undertaken with such success and have given such excellent results.

Auguste Reverdin[34] has proposed a further technical improvement, which seems to me to be destined to render good service. He leaves the catgut for four hours in a sterilizing oven at 284° F. before putting it into the oil of juniper and alcohol. He advises one to be sure in the first place that the catgut has not been oiled by the manufacturer for purposes of preservation. In any case, I think it well to remove all grease with ether, before submitting it to any other proc-

ess. Benckiser,[35] who has adopted the method of disinfection by heat, places his rolls of catgut in envelopes, before putting them in the sterilizer—opening the envelope only at the very moment of using the catgut.

Many surgeons prefer to disinfect the catgut with carbolic acid or corrosive sublimate. The following method is that used in Berg-

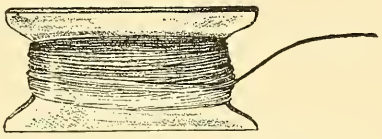


Fig 15.—Glass Reel for Silk or Catgut.

mann's clinic.[36] The gut is immersed for ten to fourteen days in the following solution which is renewed from time to time:

Hydrargyri bichloridi, ...	1.
Alcoholis, ...	800.
Aquæ destillatæ, ...	200.

J. L. Championnière, following Lister's plan, macerates the catgut in this mixture:

Acidi carbolici, ...	20.
Aquæ, ...	21.
Olei olivæ, ...	100.

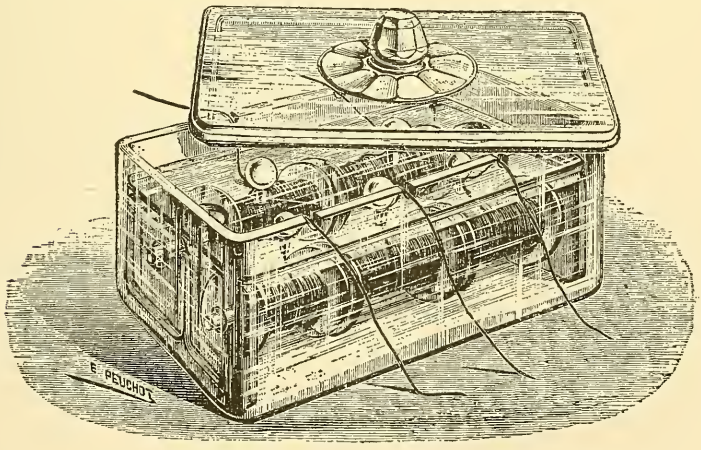


Fig. 16.—Reels for Silk or Catgut.

The carbolic acid is dissolved in the water, then emulsified with the oil by vigorous shaking. It takes five or six months of maceration to

produce a well-prepared catgut and even then it is oily and disagreeable to handle.

Mikulicz has indicated a method of preparation which transforms the catgut into a remarkably resistant and tenacious material for sutures, which Leopold has adopted for Cæsarean sections. The catgut is first put for forty-eight hours in carbolized glycerin, 10 parts to 100, then for five hours in a solution of chromic acid 1:200, and finally preserved in absolute alcohol.[37]

Silver Wire, Silk-worm Gut.

After heating to 250° F. in a sterilizer, these may be preserved in rectified spirit.

Drainage Tubes. Elastic Ligatures.

These may be made relatively pure by leaving them for ten minutes in boiling water, and then preserving them in strong carbolic water, or in a sublimate solution, in bottles with tightly-fitting corks. Their absolute disinfection is, however, not assured by this process, for this temperature and these solutions, while doubtless sufficing to destroy germs, leave the spores unaffected. It is impracticable to leave rubber in the sterilizer at 250° F., because heat spoils it. Therefore we have recourse to a roundabout method. We promote the germination of spores in order to destroy them later. This is done by leaving the rubber objects for five days in water which is kept at about 95° F. in a culture oven, renewing the water daily. After this process they are to be placed in a solution of corrosive sublimate or carbolic of 50:1,000, which is to be changed every second day for the first fortnight. At the end of this time they may be used with absolute security.

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CHAPTER II.

ANÆSTHESIA IN GYNÆCOLOGY.

Local anæsthesia may often be employed with good results, the method differing according to whether the operation be upon the skin or mucous membrane. For an incision, or a rapid dissection, we may freeze the part by means of a mixture of cracked ice and salt, operating the very moment the skin becomes white, for an undue prolongation of the action of the cold might result in a blister or even a slough. Richardson's ether spray is exceedingly convenient and too well known to need description. It possesses the drawback of slow action and of preventing the use of the thermo-cautery; some foreign authorities, and Terrillon[1] in France, have proposed replacing it with a spray of bromide of ethyl, which is non-inflammable; but this in its turn possesses disadvantages which have interfered with its widespread use.

Cocaine chlorhydrate can be used for anæsthesia of the skin.

Wölfler[2] has demonstrated that if you inject hypodermatically, or preferably endermatically, fifteen minims of a five-per-cent solution, at the end of one or two minutes a local anæsthesia will be produced which will last from twenty to twenty-five minutes. The zone of anæsthesia will extend about two to three centimetres around the point of entrance, and a second area of semi-anæsthesia of the same extent surrounds the first—which gives us from four to six square centimetres upon which we may operate painlessly for from twenty to twenty-five minutes. This is more time than is needed to open an abscess or remove a small tumor.[2] If the operation is to be upon a mucous surface, all that is required is to paint it over, with a ten-per-cent solution of the cocaine. This will produce an anæsthesia which may easily be prolonged by repeated applications, so that, as I can bear testimony from my own experience, an Emmet's amputation of the cervix may be done by this means. The anæsthetized mucous surface seems, to use the patient's own expression, to be "made of wood."

I am convinced that the field of local anæsthesia in gynæcology

would be greatly increased, could we but overcome the timidity of those patients whose fears yield more readily to general anæsthesia.[3] Daniel Lewis,[4] of New York, after the injection of cocaine, performed a painless amputation of the breast upon a woman of sixty years, who, on account of a cardiac murmur, was in dread of general anæsthesia. In the same way I amputated the finger of a young woman who absolutely refused to be made unconscious.

We must not omit to mention and inquire into the statement made by Hanks,[5] namely, that applications of cocaine have an injurious effect upon the union of wounds after plastic operations. In the cases quoted by the American surgeon, may this result not be due to the use of a non-sterilized cocaine solution? The water for these solutions should be distilled and then boiled, and it is well to add a few drops of Van Swieten's fluid. Nevertheless, we should bear in mind that accidents have sometimes occurred as a result of these injections, and use them with moderation. Dudley[6] reports to the Obstetrical Society of New York three cases where the hypodermatic injection of cocaine was followed by most alarming symptoms. In two of the cases he had injected a solution into the cervix before curetting the uterus, in the third, at the margin of the anus before removing a syphilitic growth. He used a ten-per-cent solution, of which he injected about fifty minims. One of the patients swooned; all were greatly depressed. Emmet has noted similar untoward results. A loss of consciousness has been observed after the hypodermatic injection of six drops of a twenty-per-cent solution of the chlorhydrate of cocaine, which is equivalent to six centigrams of the active principle.[7] Very serious symptoms, such as vomiting, extreme weakness, slowing of the respiration, and enormous increase in the pulse rate, resulted from the hypodermatic injection of one grain (sixty-five milligrams) with which Dr. B. J. Howel[8] experimented upon himself. It would seem to be unsafe to venture upon a dose larger than five centigrams, or twenty drops (about a gram) of the five-per-cent solution of hydrochlorate of cocaine. Réclus,[9] unwisely, in my opinion, does not hesitate to give twenty centigrams.

Continuous irrigation which is so useful from the point of view of convenience and antisepsis, has also a remarkable power of diminishing pain, especially when even a weak solution of carbolic acid is used (10 : 1,000).

Finally, in extremely nervous or hysterical women, we may obtain sufficient anæsthesia by means of hypnotic suggestion.[10] I call atten-

tion to this as something of a pathological curiosity; nevertheless, at Lourcine-Pascal I have several times been enabled to curette a patient without causing pain, by simply suggesting that she was not suffering, and this without having to put her to sleep. Very recently Geyl,[11] of Dordrecht, was able to excise a prolapsed rectum and amputate a cervix by complete anæsthesia from hypnotic influence alone, lasting two hours in the first case, one hour in the second.

Mesnet[12] reports to the Academy of Medicine a case of vaginal cystocele painlessly operated upon under the same conditions.

General anæsthesia is indispensable in major operations; it may even be used in slight ones if administered with the proper precautions. I usually employ it when curetting a uterus.

Finally, when an examination of the abdominal organs presents much difficulty, anæsthesia is a necessity. The exploration is greatly facilitated by the resulting flaccidity of the abdominal walls and the absence of reflex movements caused by pain. This exploratory anæsthesia should be the rule in many procedures, as without its help it is often impossible to obtain an exact knowledge of the condition of the uterine appendages where these are inflamed. Lawson Tait, Keith, and other English operators prefer ether to chloroform, claiming that there is less excitement and less vomiting from its use. But it has been charged with an injurious action upon the renal epithelium, which would contra-indicate its use wherever the kidneys are affected, as is often the case in patients with abdominal tumors.

Lee, Dudley, Freeman, and Talbot[13] have instanced such cases.

Many German laparatomists use a mixture of chloroform and alcohol; the anæsthesia is said to be more uniform, and vomiting less frequent. In France, chloroform reigns almost without a rival. Its purity should always be tested, especially if the anæsthesia is to be of long duration.

Under the same conditions and for peculiarly nervous and excitable patients, I have found it advantageous to precede the administration of chloroform with a hypodermatic injection of one and a half centigram (twenty-five to thirty drops) of this solution:

Distilled water, ...	10.00
Morphine hydrochlorate, ...	10.00
Sulphate of atropine, ...	0.005

This should be given fifteen or twenty minutes before the chloroform. The resulting unconsciousness is more regular and of longer duration,

although much less chloroform is required, and it also makes it easier to administer the anæsthetic with care. This process of mixed anæsthesia, which we owe to Dastre and Morat, can scarcely be awarded too much praise in operations of any considerable length. It is designed to avoid the symptoms due to chloroform which the surgeon is unable to combat—laryngo-reflex syncope—especially secondary syncope. It prevents the initial excitement, diminishes the nausea, limits the amount of chloroform used, and consequently lessens the chances of chloroform poisoning in operations of long duration.[14] My learned friend, Professor Dastre, has assured me that in his laboratory experiments, before he adopted this method, he lost one out of every four dogs anæsthetized. For the past ten years (1879–1889) he has used it upon hundreds of animals, and has not lost one. Safety and convenience are both gained by the process. It has been adopted by practical surgeons. Aubert, head surgeon of the Antiquaille in Lyons, uses it to the exclusion of all other methods, and testifies to its value in these words (C. R. Soc. Biol., 21st April, 1883, p. 282): "I know of nothing better nor more practicable. This method has the following advantages: 1. Safety. 2. More rapidly-induced unconsciousness. 3. Absolute calm on the part of the patient. 4. An easy awakening. 5. Very little malaise or vomiting as sequelæ. Many of my colleagues in Lyons, especially Professors Gayet and Leon Tripier, have at my instigation used this method of anæsthesia. The number of cases experimented upon (1887) amounts to several thousands, with no resulting accident." This mixture of morphine and chloroform was first used experimentally as an anæsthetic by Claude Bernard in 1864, and in surgery by Nussbaum, of Munich. Further researches were carried on by Labbé and Guyon, Guilbert de Saint-Briene, Labbé and Goujon (1872). The combined use of chloral and chloroform was tried by Dr. Forné (1874) and Dr. Dubois upon alcoholic patients. Professor Trélat used this same mixture in operations when the patient needed only to be slightly stupefied (4 to 9 grams of chloral hydrate to 20 to 40 grams of the syrup of morphine of the codex, in 120 grams of water, to be taken in two doses at an interval of fifteen minutes). Lastly, alcohol has been combined with chloroform and with ether (Dubois, 1876), more especially in alcoholic cases.[15] The patient is anæsthetized in bed, and taken to the amphi theatre in a ward-carriage (Fig. 17), thus avoiding the disagreeable impression produced by the sight of the surgical preparations, and facilitating the first steps in the administration of the chloroform.

We must bear in mind that if anæsthesia be unduly prolonged, it may have a serious effect upon the nervous system and upon the kidneys. The fatal results of many cases reported under the head of shock, may be traced to the depressing effects upon the nerve centres of an anæsthesia prolonged to two or three hours. It is not impossible that many of the so-called reflex symptoms occurring after utero-ovarian operations may be due to the same cause; more particularly what has been termed the guttural-reflex symptom, characterized by incessant and painful expectoration.[16] I have had the opportunity of observing this symptom after long operations other than

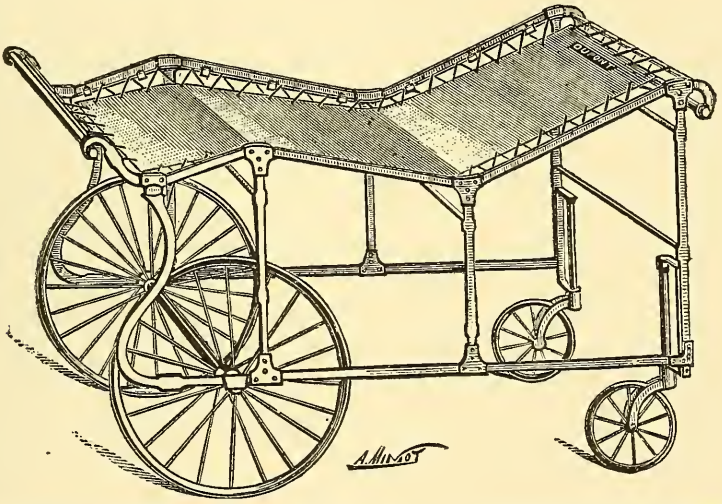

FIG. 17.—ROLLING CARRIAGE USED AT THE LOURCINE-PASCAL FOR TRANSPORTING PATIENTS FROM BED TO THE OPERATING ROOM.

abdominal, and I feel convinced that it is due to real chloroform-poisoning.

Further, the absorption of a large quantity of chloroform or ether, and its consequent elimination by the kidneys, may determine an intense renal congestion with or without albuminuria. I first called attention to this fact in a work published in the *Annales de Gynécologie* in July, 1884 ("De la valeur des altérations du rein consécutives aux corps fibreux de l'utérus pour les indications et le pronostic de l'hystérectomie"). This is what I wrote at the time: "The long duration of anæsthesia in operations, especially hysterectomies, has doubtless a large share in the causation or aggravation of renal affections in the patient. Chloroform absorbed in great amount cannot fail to have an action upon the renal epithelium, and thus interfere

with the elimination of the constituents of the urine; this action may be the source of immediate danger when there is a pre-existing lesion of the organ." A few months later, Terrier, at a meeting of the Surgical Society held on the 17th of December, 1884, presented a paper based upon the analyses of his pharmaceutical interne G. Patein, on the presence of albumin in the urine after the administration of chloroform; he read a second paper upon the same subject the 1st of April, 1885. Terrier and Patein, from the most exact analyses of the urine of patients who had ovariotomy performed, reached the following conclusions:

1. After anæsthesia alone, the number of cases in which albumin is found is about doubled, and the quantity of albumin greatly increased.

2. After anæsthesia plus the operation, albuminuria is almost the rule. They agree with Professor Bouchard in attributing this albuminuria to, 1st, the action of the chloroform; 2d, the operation, which excites the sensory nerves. This albuminuria, when not immediately fatal, may be of temporary duration (see Patein's Thesis, Paris, 1888: "De l'albuminurie consécutive aux inhalations chloroformiques"). This undoubtedly has much to do with the symptoms of dyspnœa which have been known to follow laparatomies. It is especially after abdominal hysterectomies that these cardio-pulmonary symptoms have been observed, and we know that in these cases the kidneys are peculiarly vulnerable, since abdominal tumors in general and fibroids in particular are a predisposing cause of chronic nephritis. The renal filter is then in a defective condition, and powerless to rid the circulatory current of the toxic agent introduced by a long pulmonary absorption. Moreover, in patients with abdominal tumors, the heart, as well as the kidneys, is often affected (see also chapter on fibroma), and it is easy to comprehend why, in these persons, a prolonged anæsthesia is followed by certain fatal symptoms whose pathogenesis has not heretofore been thoroughly understood. I have alluded to heart lesions as frequently complicating abdominal surgery. Granted that they call for especial precautions as to the duration of anæsthesia, do they absolutely contra-indicate the administration of chloroform? In France, the prevalent opinion is that they do, but according to the greatest English authorities on ovariotomy, they do not. The latter claim that in chloroform anæsthesia fatal results are due to a reflex inhibition of the cardiac centres or of the respiratory and vaso-motor centres; that this reflex inhibition is most apt to

occur where there is organic disease of the heart, and that, therefore, paradoxical as it may seem, it is in reality logical to administer chloroform in just such cases, and to push it to the point of complete abolishment of reflexes.[17] Fatty degeneration of the heart, chronic renal disease, atheroma of the arteries, and extreme weakness constitute absolute contra-indications to the use of chloroform.

It is quite unnecessary to give details upon the manner of administering an anæsthetic, and methods of resuscitation in case of accident. A few words of counsel, however, may be to the point.

An important preliminary precaution is the removal of false teeth and plates. The face should be anointed with oil of some kind, to prevent the irritating effect of chloroform during prolonged anæsthesia. The chloroform itself should have been recently purified, and kept away from the light; the required amount may be put, just before the operation, into a flask provided with a double tube, or else with a cork in which you can make a small opening to limit the amount used. Junker's apparatus is much used in other countries; in France we prefer to use a folded piece of linen, a simple procedure, which the English sometimes describe as the Scotch method, and which allows of a close inspection of the patient's face. It should be held a little ways from the nose and mouth, and in order to prevent much loss of chloroform by evaporation as well as to make the compress easier to handle, it is well to cover it with a piece of oiled silk.

Wherever practicable, one assistant should devote himself to the administration of the chloroform, giving it in small, but oft-repeated doses, closely watching the pulse and respiration.

To prevent accidents, note the respiration and the pupils even more carefully than the pulse; draw the tongue forward by pressing upon the lower jaw, or by seizing it with the forceps. Spring forceps are to be avoided, as they produce sloughing. I use forceps of my own devising (which Aubry has manufactured for me for ten years); the spatulated blade is slipped under the tongue, and the two sharp teeth of the upper blade give a sure hold at the expense of very slight wounds.

Certain circumstances in gynæcological operations call for especial care. Respiration is embarrassed, and the difficulties of anæsthesia increased, when the patient lies upon her side or is kept in the genu-pectoral position. There are also some processes connected with laparatomies during which the dangers of anæsthesia are augmented; the withdrawal of a great amount of fluid or of a large tumor, traction

upon the pedicle of a uterine tumor, or upon the broad ligament may be the cause of reflex action upon the respiratory or circulatory apparatus. Interference with respiration due to a mechanical cause, such as the accumulation of mucus in the pharynx, is a mere incident and not an accident, easily remedied by introducing a sponge upon a holder, pressing it firmly and deeply and removing the obstruction.

Should dyspnœa supervene, or the breathing cease, have recourse at once to artificial respiration, practised slowly, regularly, persistently. If the pulse stop suddenly and syncope occur, keep the head

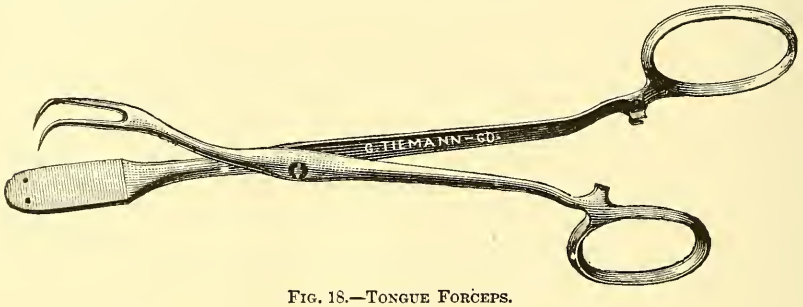

Fig. 18.—Tongue Forceps.

dependent, flagellate the surface of the body, sprinkle cold water upon the face and back of the neck, apply electricity to the phrenic and pneumogastric nerves and perform artificial respiration. Assistants should take turns in applying this last means of resuscitation, which I have seen result in complete recovery at the end of twenty minutes. Should the room be very warm, or full of the fumes of carbolic acid, it must be freely aired.

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16. J. L. Championnière: Des Réflexes Observés après les Opérations Utéro-ovariennes. Annales de Gynécologie, May, 1888, p. 592.

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CHAPTER III.

METHODS OF SUTURE AND HÆMOSTASIS.

Sutures.—Union by first intention, which, with a few exceptions for special cases, has become the rule in modern surgery, is of prime importance in gynæcology; upon it depend the success of plastic and the innocuousness of other operations. I shall not dwell upon the local conditions necessary to such union; the cardinal principles are known to be these: that the wound be clean cut, its surfaces smooth, accurately approximated, and without dead spaces, that no traction be exerted, and but little pressure applied. The raw surface should be thoroughly pared and all superfluous tissue removed by means of curved scissors; the sutures should then be so applied as best to imitate the normal condition of the tissues.

Although all gynæcologists are doubtless familiar with the ordinary rules of surgery, it will be well in this connection to repeat certain points of especial importance.

The needles may be used in one of several ways. 1st. They may be held in the fingers; this is extremely inconvenient and should be done only where absolutely necessary.

2d. Needles immovably attached to a handle are used in passing through resistant tissues or parts difficult to reach. Deschamp's sharp-pointed needle, which is of this description, may be used to advantage high up in the vagina, upon the cervix uteri, or in the culs-de-sac, but where the needle has to pass through relaxed tissues rich in blood-vessels (ovarian pedicles, round ligaments, etc.), blunt needles with a rounded edge will push aside the vascular tissues without wounding them.

I have already said that grooved needles or those with movable eyes should be discarded on account of the difficulty of keeping them clean.

3d. The needles may be inserted in a holder. This is the most usual method.

Three kinds of needles are used: ordinary surgical needles, which are flat and slightly enlarged near the point, giving them a lanceolated

appearance. They penetrate the tissues with ease, but make a transverse incision which is drawn upon and enlarged when the sutures are tied (Fig. 20). Curved needles, or those curved near the point are most in use.

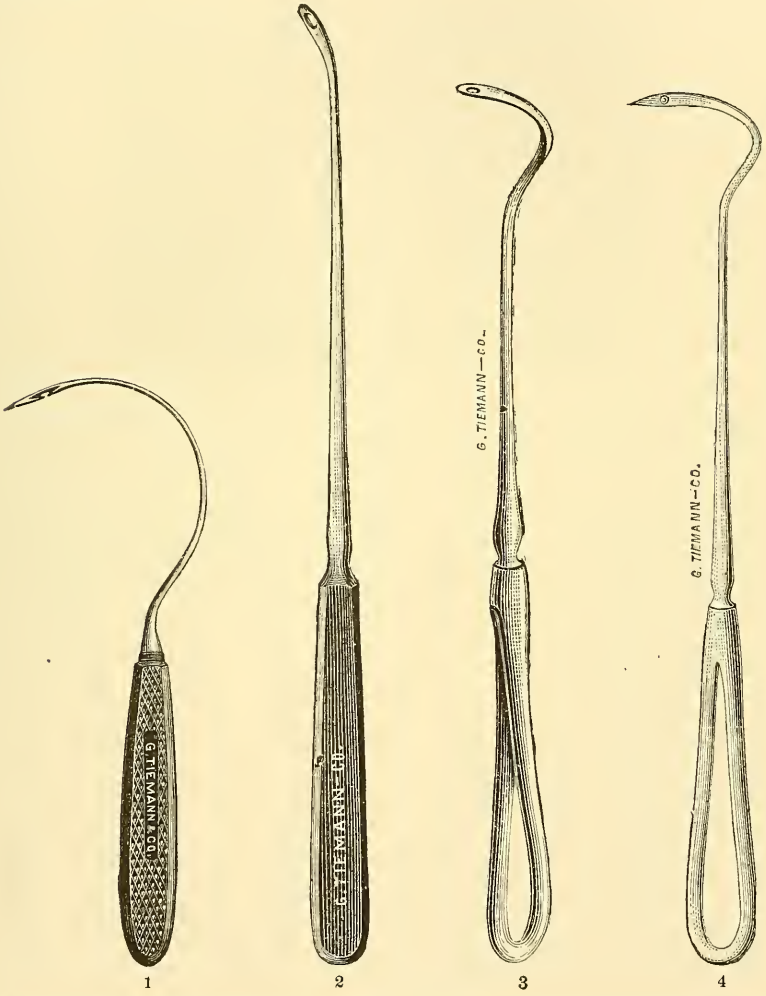

FIG. 19.—LARGE MOUNTED NEEDLES. 1, Emmet's, Croft's, or Péan's; 2, blunt pointed; 3, blunt Deschamp's; 4, sharp Deschamp's.

Hagedorn's flat needles (Fig. 21), curved on the edge and bevelled at the point, possess a greater cutting power than the old surgical needles. They are of the greatest use in plastic operations.

One should have on hand a supply of needles of all sizes: very fine ones are required for certain plastic operations, as in vesico-vaginal

fistulæ; while for suturing the abdominal walls after a laparotomy, it is well to have needles of more than ordinary strength (Fig. 22). The choice of a needle-holder, of which there are many varieties, depends

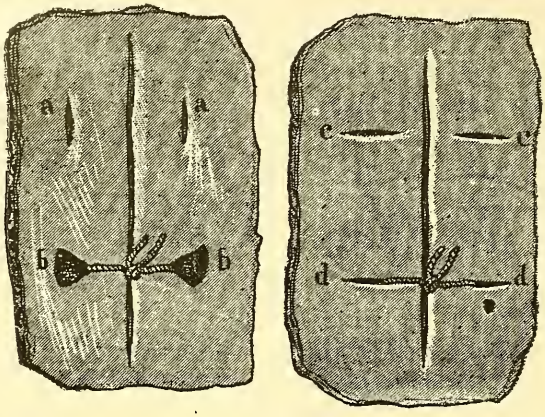

FIG. 20.—DESIGNED TO SHOW THE SUPERIORITY OF THE FLAT OVER THE ORDINARY NEEDLE. *a*, *a*, Skin wounds made by ordinary surgical needle; *b*, *b*, enlargement of these orifices by the suture; *c*, *c*, wounds made by Hagedorn needle (*d*, *d*) which are not enlarged by the suture.

upon whether the operation demands chiefly great accuracy or strength. If the former, it may be found more convenient to use a

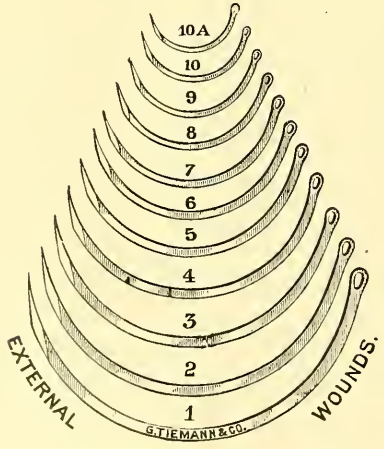

FIG. 21.—HAGEDORN NEEDLES.

FIG. 22.—ORDINARY SURGICAL NEEDLES MADE STRONG FOR SUTURING THE ABDOMINAL WALLS AFTER LAPARATOMY.

lock-forceps, which obviates all necessity of keeping the needle in place by pressure on the handle, and allows of concentration of attention upon the movements of the needle. Collin's forceps meet this

indication, and with my modification will hold the Hagedorn needle. They can be taken apart and cleaned (Fig. 23).

If thick or resistant tissues are to be sutured, larger needles should be used, and a strong holder without a lock will give greater leverage, with less fatigue than any other. Grasp of the needle and forward pressure are made simultaneously and are equal in force. The for-

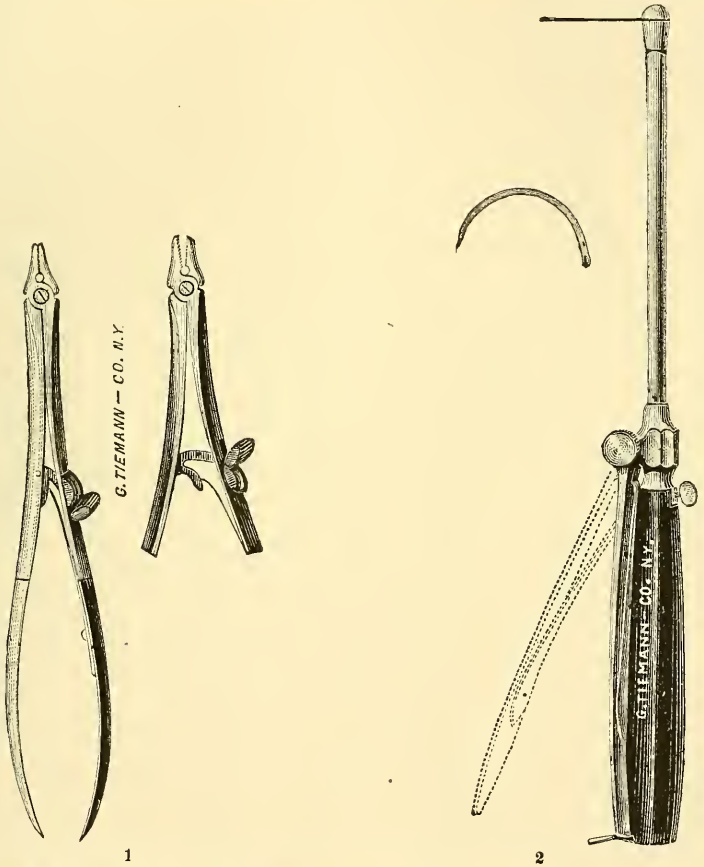

FIG. 23.—1, Small needle holder with catch (Collin); 2, Pozzi's holder for flat needles.

ceps used by A. Martin (Fig. 24, 1) is of unusual size, but I can testify from personal experience that it is not too large. Collin has made for me a needle-holder of this description for large ordinary needles (Fig. 24, 2) and one for Hagedorn's needles (Fig. 24, 3). The latter seems to me greatly superior to the spring-forceps of the German surgeon. For the intestinal sutures which may be required during a laparatomy, round sewing needles will be found to make a smaller

incision than any of the foregoing. Figure 25 shows the most frequently used intestinal sutures; those of Lembert, Czerny, and Gussenbaur.

Suture Materials.—Formerly hemp, silk, and linen threads were used for suturing; the laws of antisepsis had not then been formu-

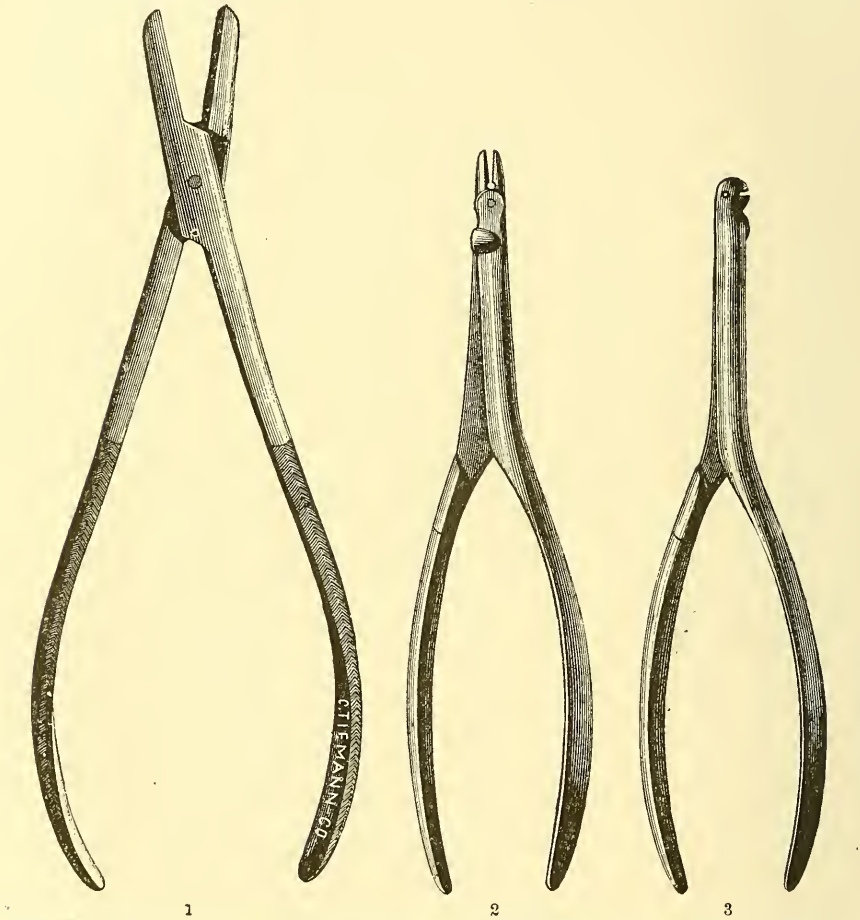

FIG. 24.—1, Martin's needle holder; 2, holder for large ordinary needles; 3, Pozzi's holder for large Hagedorn needles. (Each ½ size.)

lated, and the necessity for aseptic suture materials was unknown; the threads in use, by their porous qualities, were veritable breeding places for germs, and suppuration invariably followed their use. The introduction of wire sutures by the American gynæcologist Sims, was a step in advance whose importance at the time could scarcely be exaggerated. Silver wire was of all the most aseptic, which no doubt

accounts for the marvellous results obtained and the enthusiasm aroused by its use.

Even at this date it is in general use, in France especially, and it certainly possesses some advantages. On the other hand it breaks easily; when tied around a somewhat thick mass of tissue it cuts it more than other threads; it requires more time for its application. If it is cut off short, the ends wound the vagina and the perineum; if left long, they may be pulled upon. For these reasons I have almost abandoned its use, replacing it with catgut or antiseptic silk. Hegar[1] makes use of wire in cavities like the vagina, where silk easily becomes septic. In my opinion, however, frequent injections of bichloride or insufflations of iodoform would suffice to prevent sepsis.

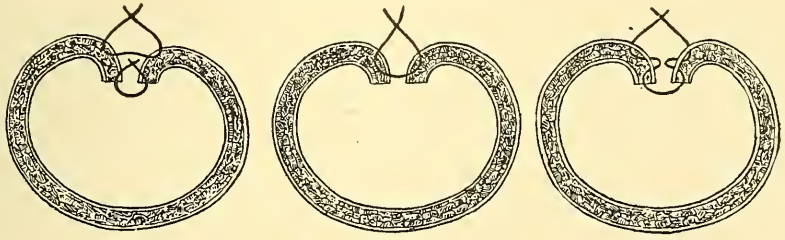

FIG. 25.—INTESTINAL SUTURES. 1, Czerny's suture; 2, Lembert's suture; 3, Gussenbauer's suture.

Silk-worm gut is as impermeable and non-absorbable as silver wire; it is less easily broken, but less flexible, and applicable to all cases where wire is used; it is given the preference by many authorities, as Bantock and Sänger. I find that the knot does not hold as well as that of catgut or silk, and that it is as difficult to twist as wire, so that the stitches seem to me somewhat insecure. Moreover the ends become stiff as they dry, which is a matter of some importance in plastic operations on the vulva and vagina. Nevertheless it is a good material for sutures. The best is slightly reddish in color; it should be soaked in a carbolic or bichloride solution for about a quarter of an hour before using, otherwise it will be inconveniently stiff.

The best silk is the braided, and not the twisted variety; it comes in very fine strands, and when rendered antiseptic is an excellent suture material. It may even be used for buried sutures; Billroth uses it exclusively. Experimentation has shown that not only is it well borne by the tissues, but that it is even absorbed by them, yet in these two particulars it is inferior to good catgut. Therefore in cases where there is no especial resistance to be overcome, and

where the suture need not remain for any great length of time, I should use catgut, but in suturing the intestines, the stomach or the bladder, I give silk the preference. It is also desirable to insert silk sutures at intervals to support a continuous catgut suture.

Owing to the porosity of silk, it possesses one serious drawback; that of secondary infection. Buried silk sutures in any place where suppuration is likely to occur may be the cause of fistulæ, which will not close until the septic piece of silk be eliminated. In such cases, it will be found best to use catgut for ligatures and silk-worm gut for the sutures; being non-absorbent they are less liable to infection. This applies with peculiar force to operations for pyo-salpinx and pelvic abscess, where the sutures come in contact with suppurating matter, and in sutures of the abdominal walls, where they are placed near drainage tubes or tampons. Here catgut, silk-worm gut, or silver wire should be employed. There is no material used for ligature and suture in either general surgery or gynæcology, to be compared to catgut. Its property of disappearing by absorption in from eight to fifteen days, according to its thickness and the method of its preparation, renders it invaluable for sutures buried in the abdominal cavity, and for operations on the cervix and vagina, where the removal of the stitches is attended by both difficulty and pain. Catgut prepared in chromic acid is the only kind which is not absorbed. It is then even more durable than silk. I use it exclusively in my operations, occasionally reinforcing it by a supporting suture of silk or of silver wire. Catgut loosens more readily than silk, and should be tied in three knots to avoid mishaps. The commercial article is unsatisfactory; it should always be prepared by one's self or a competent assistant. In spite of its drawbacks, however, I think that Kocher, of Berne, carries his objections to it too far, and consider it too valuable to be discarded.[2]

Methods of Suture.—The tendency of the present day is toward simplicity, and the reduction of the number of sutures in practical use for gynæcological operations to a few well-chosen methods, of which the following are the chief:

1. Interrupted suture.

2 and 3. Simple continued suture and continued sutures in layers (étages).

4. Mixed sutures.

5. Quilled suture.

1. *Interrupted Suture.*—Whatever the extent of the wound, its

surface must all be taken in by the suture, otherwise pocketing and an accumulation of fluid may result which will distend the wound, preventing union, and may increase the chances of sepsis. To meet this requirement Hegar, following Simon's method, directs the needle deeply under the whole surface of the wound, so that the suture is imbedded in tissues. Occasionally the thread may cross the wound at about half an inch or an inch above the denuded surface (Fig. 26). The needles used in approximating surfaces (as in colpo-perineorraphy, etc.) should be both long and strong. After uniting the deeper tissues by these concealed sutures, the lips of the wound should be drawn together by superficial stitches, placed near the margin. These, while applied last, are tied first; the deeper stitches are tied last. This method insures a more exact approximation. The deeper the

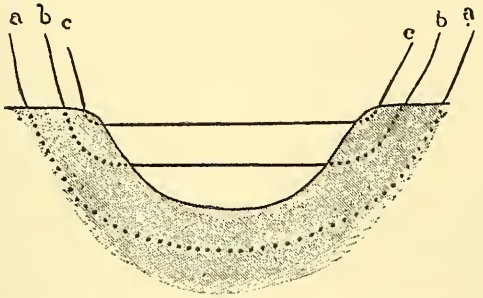

FIG. 26.—COURSE OF INTERRUPTED SUTURES. *a*, *a*, Deep suture including whole surface of wound; *b*, *b*, suture including a part only of the denuded surface; *c*, *c*, superficial suture including edges only of wound.

wound, the farther from the edge should be the point of entrance and exit of the needle (Fig. 26). Traction exerted upon one long strand, certainly puckers the edges of the wound; to correct this defect the idea was conceived of using buried sutures in layers of different depths. A layer of interrupted catgut sutures brings together the deepest portion of the wound, successive layers approximating the remainder of the surface. Werth,[3] in 1879, applied this method to perineorrhaphy; Schroeder and his school at once adopted it. In many cases it is an excellent procedure, but it possesses the disadvantage of leaving knots of the catgut in the depths of the wound, materially interfering with the approximation of the surfaces. The continuous suture has obviated this difficulty. When, at the instigation of a number of surgeons,[4] this suture, so long in disuse, was again brought forward, Bröse[5] lost no time in applying it to the plastic operations of gynæcology. Schroeder and his pupils likewise made extensive

use of it.[6] It is both efficacious and rapid in its application, and is particularly useful where several operations have to be done at one sitting; as, for example, amputation of the cervix with anterior colporrhaphy, colpo-perineorrhaphy, and Alexander's operation. (Patient with hypertrophied cervix and genital prolapse.)

Simple Continued Suture.—This can be advantageously employed wherever the surfaces to be approximated are neither extensive nor

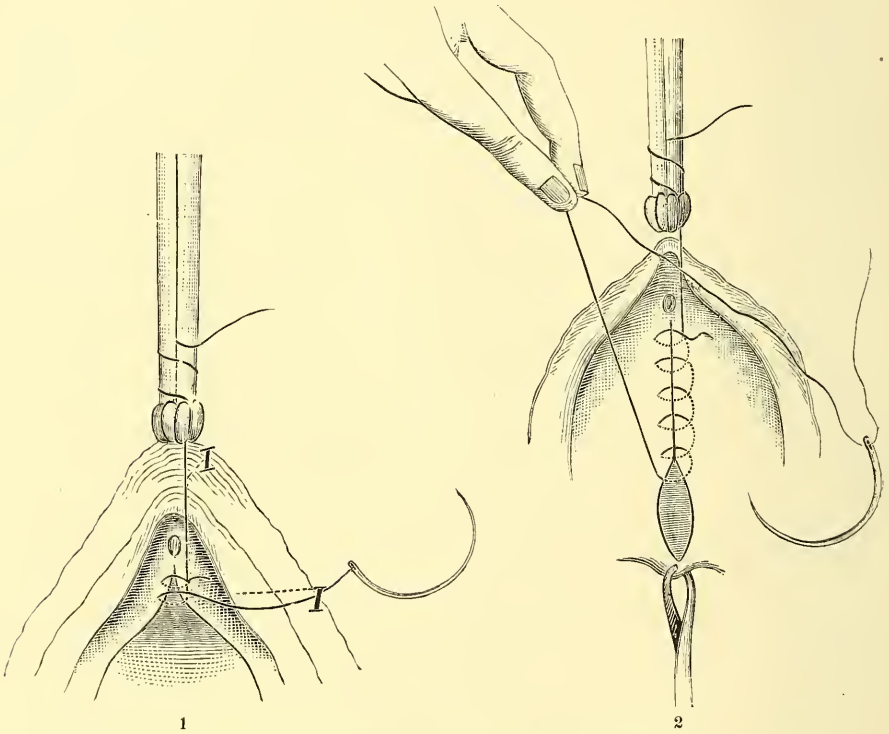

FIG. 27.—1, First step in a continued suture. *I, I*, Catgut. 2, Final steps in the continued suture.

deep; it is also used in hæmostasis, as I have already remarked. The needle is introduced at one extremity of the wound, and the terminal end of the catgut tied in three knots, leaving a short free end which is grasped by forceps (in the cut is shown Baumgärtner's forceps, specially constructed to facilitate traction upon the thread in deep ligatures). This is held by an assistant, and serves to steady the suture (Figs. 27 and 28). Introducing the needle a little from the edge, it is carried below the surface of the wound and emerges at a corresponding point on the opposite side; the thread is gently pulled through, and an assistant holds the forceps while the second stitch is

taken. He must be cautioned not to let it go suddenly when the second stitch is drawn through, but to follow the motion with his hand to prevent relaxation of the first stitch. When the suture is about half done, it is well to make light traction upon the opposite angle of the wound with a bullet forceps, in order to have the edges even. The thread may be tied to the eye of the needle to prevent slipping.

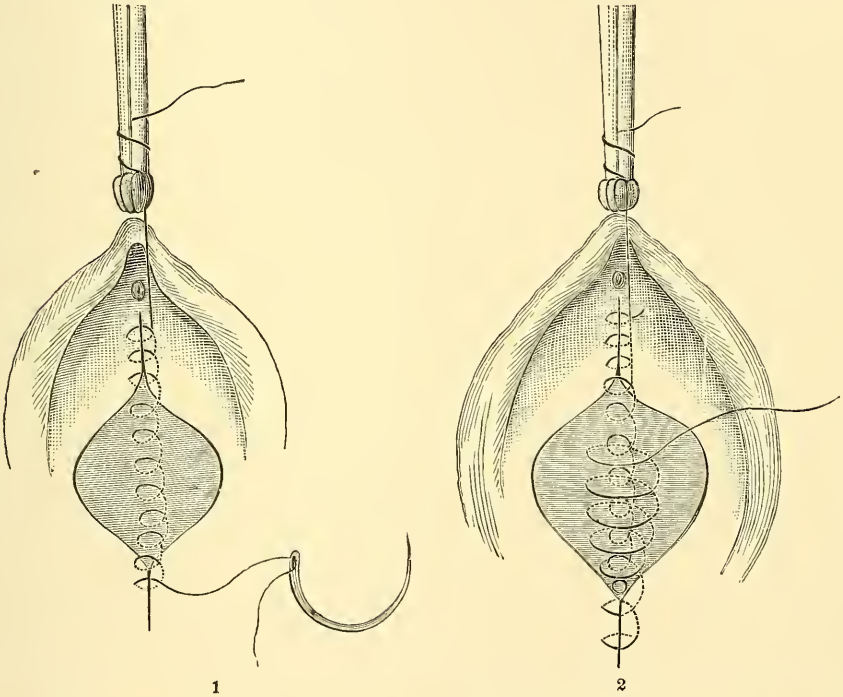

FIG. 28.—1, Continuous suture in layers (one at the angle, two in the centre of the wound); 2, continuous sutures in layers (one at the extremities, three in the centre of the wound).

3. *Continuous Sutures in Layers.*—These are used where one row of sutures does not suffice to approximate the denuded surfaces. In this case the needle, instead of being introduced through the skin outside of the wound, is carried into the raw surface, the distance from the edge depending upon the extent of the wound, and the depth to which the needle can be carried. When the deepest surfaces have been drawn together, the sutures are taken through the skin, and the operation is terminated by a superficial spiral suture forward and then back (Fig. 28). It may be necessary to make three layers of stitches. They should not be taken too closely together nor pulled too tightly.

We may fasten the suture in several ways. If we have brought the thread by a second layer back to the starting-point, we simply tie it three times to the projecting end; if the ends of the thread are not together, we draw the last stitch out into a long loop and tie that to the end; or we may draw the end of the thread through the eye of the needle in such a way as to leave a projecting end after the last stitch is taken—this we tie to the double loop of the stitch.

If in suturing the upper part of the wound, the thread of the deeper suture should accidentally be cut, or should it break, another stitch should immediately be taken at the point of rupture and securely tied; the suture is continued with this second thread. Where-

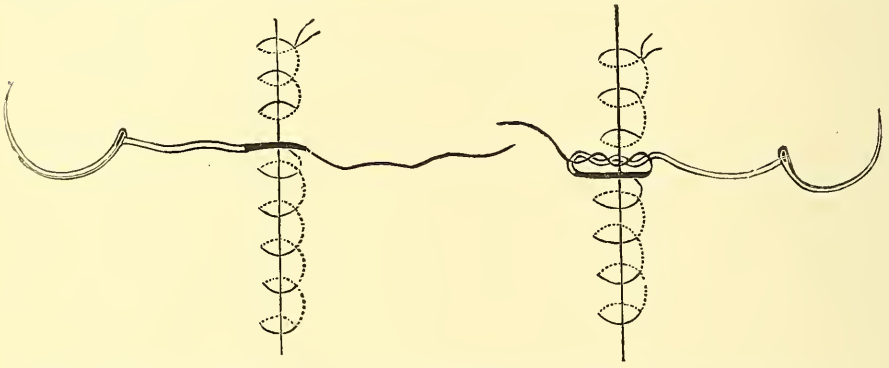

FIG. 29.—SUTURE IN LAYERS. Shows method of fastening the thread in the middle of the suture by means of a loop.

ever the thread is liable to be much pulled upon, as, for instance, at the point where the suture changes its direction, I strongly recommend the insertion of supporting stitches of silk or silver wire, to take off the strain from the catgut (Fig. 30).

In a perineorrhaphy I place one at each extremity of the perineum; the anterior one encircling the terminal point of the reconstructed recto-vaginal partition, the posterior uniting the extremities of the anal sphincter. In a colpo-perineorrhaphy, I put in one only at the fourchette.

4. *Mixed Sutures.*—It is often advisable to combine the interrupted and continued sutures. To illustrate this point, I will describe my mode of procedure in closing the abdominal opening after a laparatomy.

As soon as the peritoneum has been cleansed, a protective gauze sponge is spread like an omentum over the intestines, and an assistant draws the edges of the wound together and holds them in place. With

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a curved needle and catgut of moderate thickness, a stitch is taken in the peritoneum at the lower part of the wound, the end of the catgut being held with a forceps to exert a certain amount of traction; without cutting the thread, the operator rapidly sutures the peritoneum with long, basting stitches (Fig. 31); when the upper part of the wound is reached, the gauze sponge is withdrawn, and the operator now returns to the starting-point by a somewhat closer row of stitches on the aponeuroses, closing in any muscle sheath which may have been opened (Fig. 32). The forceps are now removed and the two ends of

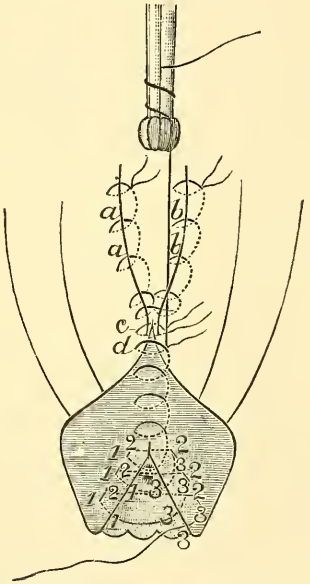

FIG. 30.—CONTINUOUS SUTURE IN LAYERS IN OPERATION FOR RUPTURED PERINEUM. 1, 2, 3, Course taken by the thread; *a*, *b*, simple continued suture; *c*, interrupted supporting suture; *d*, starting-point of the continued suture in layers.

the catgut united. There now remains only the joining of the integument, and the subcutaneous tissue, which often, however, forms a very thick layer. With a large curved needle, and silk of a strength proportioned to the thickness of the parts to be traversed, separate stitches are placed at intervals of about a half-inch. These sutures are introduced at about the same distance from the edge of the wound, penetrate through the adipose tissue until the aponeurosis is reached, and return in a similar manner through the second lip of the wound. Both ends of each suture are held by forceps, the wound is now washed with a strong carbolic solution, the edges are approximated, and with a small needle and fine catgut, or silk-worm gut, one or

two superficial interrupted sutures are placed in each interval between the deep sutures. They must be quite close to the edges and bring them into exact juxtaposition. (I often replace these by a fine continued catgut suture.) Not until these are inserted and tied, are the forceps taken from the ends of the deep sutures and these firmly fastened (Fig. 33).

If the abdominal walls be rigid, as in nulliparæ, or tense from

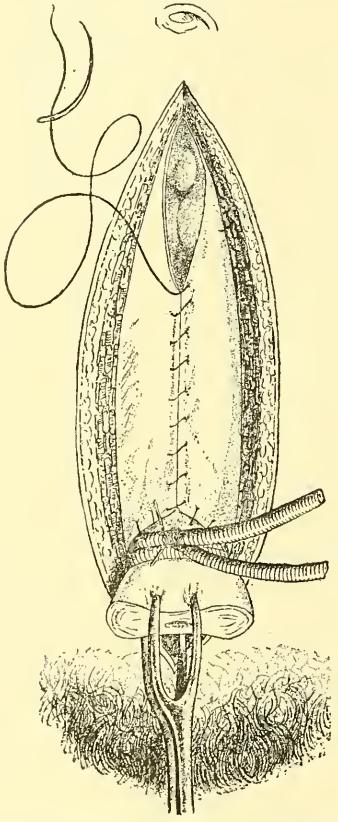

FIG. 31.—SUTURE OF ABDOMINAL WALLS AFTER HYSTERECTOMY. First stage of the continuous suture (peritoneum).

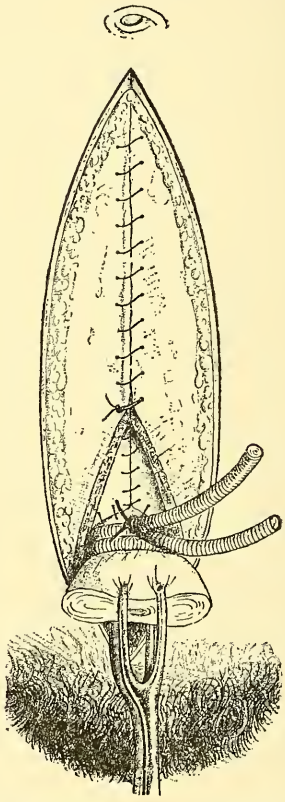

FIG. 32.—SECOND STAGE OF CONTINUOUS SUTURE (Musculo-aponeurotic Layer).

meteorism or tumors, all the deep interrupted sutures should be made with silk instead of catgut.

5. *Quilled Sutures.*—Small rolls of iodoform gauze are now substituted for the quills and lead plates in former use. Lister's button suture, with the heavy silver wire and piece of lead, has also been superseded by better processes. It is no longer used in perineorrhaphies, but there are some exceptional cases where it may be employed.

For instance,[7] where a large abdominal tumor adheres anteriorly to the parietal peritoneum, its removal will leave an extensive raw surface, caused by the stripping of the peritoneum from the internal abdominal wall. The liability to septicæmia is increased by the presence of this large and moist surface. It will then be found useful, before closing the abdomen, to carry a long, deep suture from one side to the other, supporting it at each end with a roll of iodoform gauze.

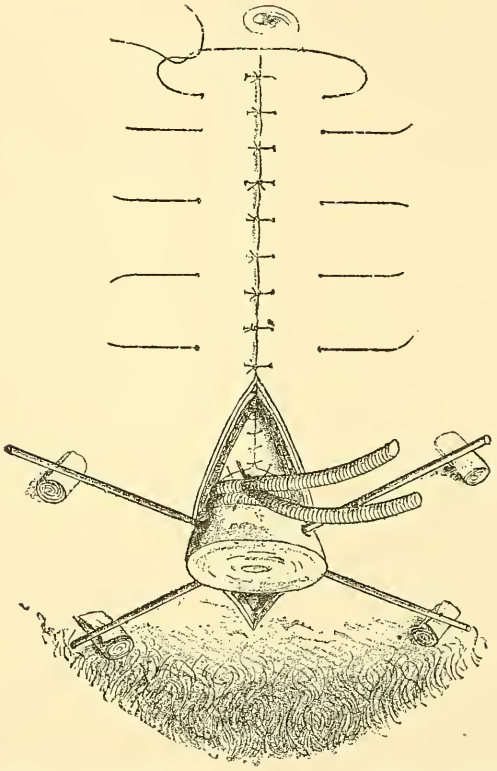

Fig. 33.—Suture of Abdominal Walls after Hysterectomy. Interrupted suture of the integuments and subcutaneous areolar tissues.

This will fold the abdominal walls above and parallel to Poupart's ligament; will exercise a beneficial pressure upon the raw surfaces, prevent hemorrhages and serous exudation, and thus eliminate one source of infection. These sutures can be withdrawn in from five to six days.

Hæmostasis.—We have compression for capillary hemorrhages; torsion for small arteries, suture for the surface of wounds. But the two methods to which I call especial attention are ligation and forci-

pressure. I shall not touch upon ligation of the vessel alone, as it has no especial bearing upon the subject in hand, but pass on to ligature in mass, which is of superlative interest in gynæcology, and by means of which we are able to control the often formidable hemorrhages of the pedicles of abdominal tumors. Wire, silk, catgut, elastic cords, and tubes have all been used in its application. We shall

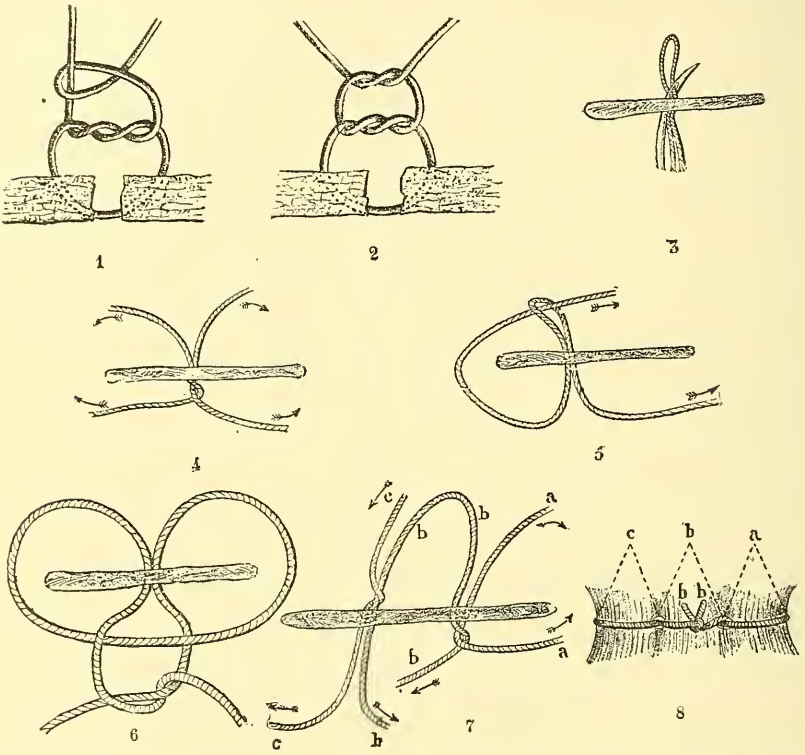

FIG. 34.—1, An improperly tied surgeon's knot; 2, properly tied surgeon's knot; 3, transfixion of the pedicle with a needle and loop of silk; 4, crossing of ends of silk after transfixion of pedicle; 5, Bantock's knot for ligation of small pedicles; 6, Lawson Tait's knot (Staffordshire knot) for ligation of small pedicles (the loop is to be thrown over the tumor); 7, continuous ligature for a large pedicle; crossing of threads; 8, continuous ligature for large tumor; threads tied (side view).

take up the matter more in detail when we study the subjects of ovariotomy and hysterectomy.

Silk is the most widely used agent for ligation in mass, as it offers the greatest amount of resistance in the smallest bulk. Braided and not twisted silk is always to be used. When, however, the ligatures are to be buried in the abdomen (as in Schroeder's hysterectomies, and Martin's intra-peritoneal enucleations) it will be found disadvantageous to use a material which is non-absorbable for a great length

of time, and yet so absorptive as to increase the liabilities of secondary infection. Since catgut prepared in oleum juniperi does not possess these drawbacks, many gynæcologists (Veit, Martin, etc.) do not hesitate to substitute its use for that of silk in buried ligatures, notwithstanding the fact that it is more difficult to tie it tightly than the silk.

I will briefly mention the different methods of ligature in mass.

If the part to be embraced is relatively thin, one loop of thread is

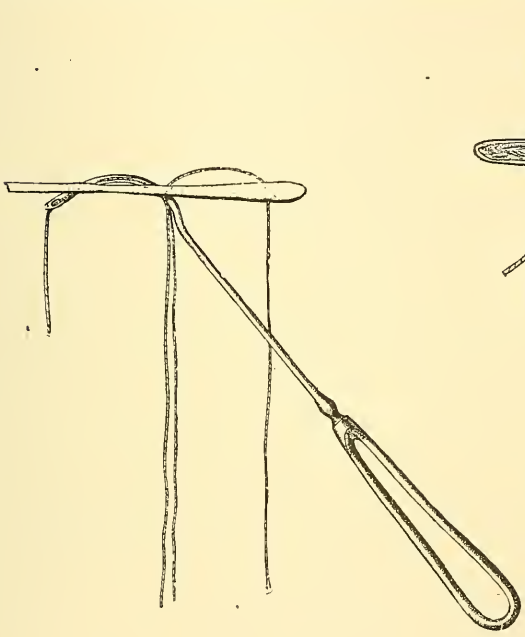

FIG. 35.—CONTINUOUS LIGATURE. Method of introducing threaded needle twice through the same opening (membranous pedicle).

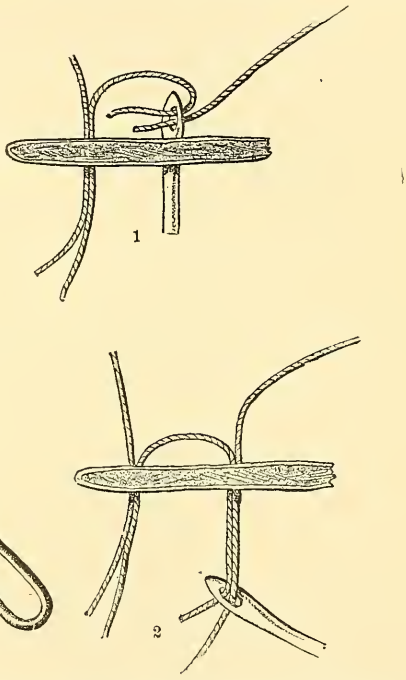

FIG. 36.—1, 2, CONTINUOUS LIGATURE. Method of introducing threads of the second loop. The first loop transfixes the pedicle and is then cut, which leaves a protruding end; this is threaded into a blunt needle in company with a new thread, and the two are again carried through the pedicle.

passed around it and securely fastened with a surgeon's knot (Fig. 34, 1, 2).

If the pedicle is thick and yet requires only two loops, it must be transfixed in the centre by a needle threaded double (Fig. 34, 3); the loop is cut, which leaves two ends on each side of the pedicle; these are crossed and tied on either side (Fig. 34, 4) or, better yet, to avoid having two knots (knots being less well tolerated by the tissues than the rest of the thread) we may use Bantock's knot (Fig. 34, 5) or Lawson Tait's Staffordshire knot (Fig. 34, 6). In a laminated pedicle, such

as we find in certain ovarian pedicles, membranous adhesions, or broad ligaments, we pass a series of ligatures, so linked together that when they are tightened no laceration of the tissues results (Fig. 34, 7, 8). Figures 35, 36, 37, 38, show with sufficient clearness the methods generally used in applying these ligatures, as well as the

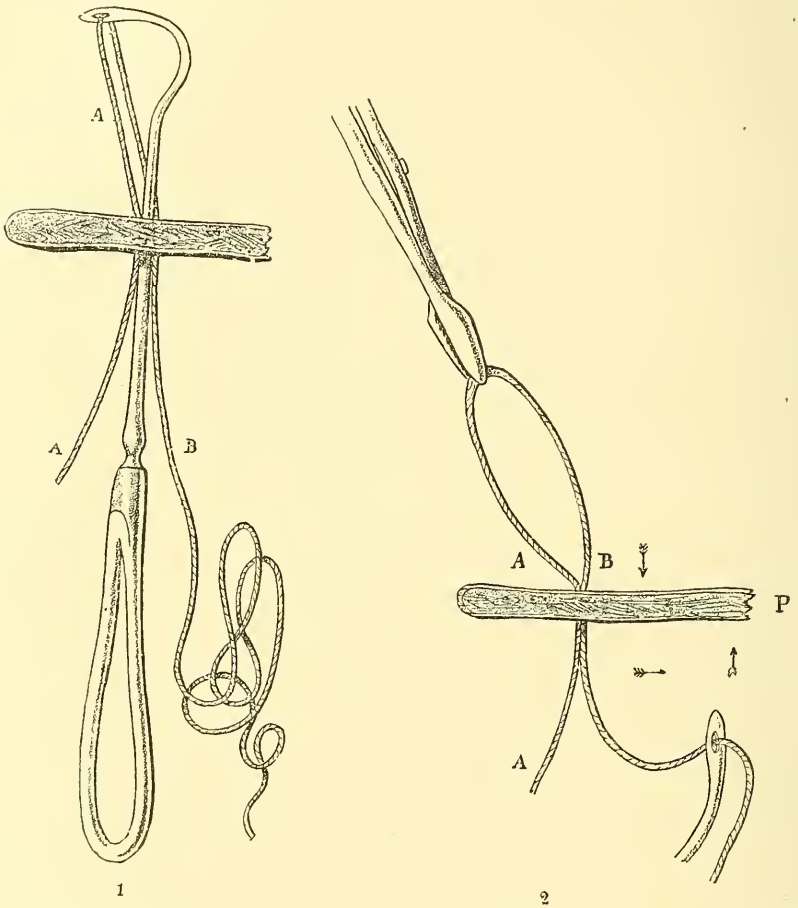

FIG. 37.—CONTINUOUS LIGATURE (WALLICH). 1, Deschamp's blunt needle transfixing the pedicle; one thread of the loop is to be seized at *A* and kept outside the pedicle, the other long end, *B*, is held coiled in the hand of the operator; 2, the loop is grasped by the forceps and held while the needle is withdrawn; it slides down the thread, *B*, and then following the direction indicated by the arrows, pierces the pedicle again, leaving a second loop in place.

method which Wallich[8] proposes to employ in their stead. This is very similar to that of J. W. Long,[9] except that he uses one fixed needle (a double-eyed needle seems to me useless) while Long has a series of ordinary-pointed needles, very imperfect for the purpose (Fig. 39).

I will merely allude to the kangaroo ligatures proposed for use by American[10] operators, and to the reindeer ligatures (threads of ostiakes) recommended in Russia.[11] They doubtless possess a remarkable power of resistance, and when deprived of their fatty constituents by ether, and submitted to a process similar to that used in the prepara-

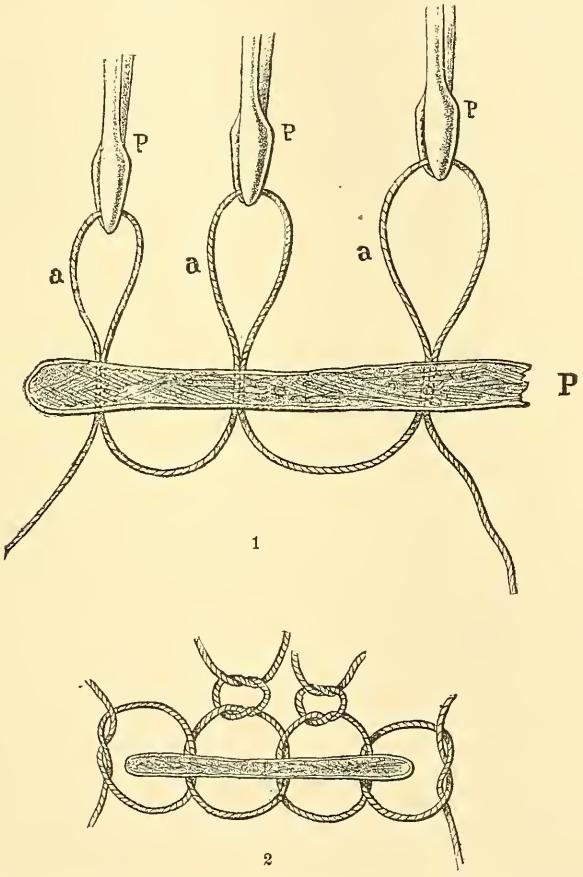

FIG. 38.—STEPS IN THE APPLICATION OF WALLICH'S CONTINUOUS LIGATURE. 1. The threads in place, the loops are to be cut at *a*, crossed and tied; 2. Threads crossed, tied, and ready to be tightened.

tion of catgut, would be a better material for ligature in mass. But the difficulty of obtaining them renders their general use in this country impossible. Ligature in mass upon the surface of the body causes death of the strangulated tissues. When buried in the abdomen, with antiseptic precautions, the constricted portions do not mortify, their vitality being preserved by vascular adhesions and by blood-vessels which pass like a bridge over the groove of the ligature. After a

while the stump shrivels and is absorbed. This has been well shown by experiments on animals.

Hegar has witnessed the perfect absorption in a few weeks, by the peritoneum of a dog, of freshly-extirpated bits of muscle; and Czerny has seen the same thing with portions of cancer, Ziegler with fragments of bone, and Tillmans with pieces of liver, kidney, and lung.[12]

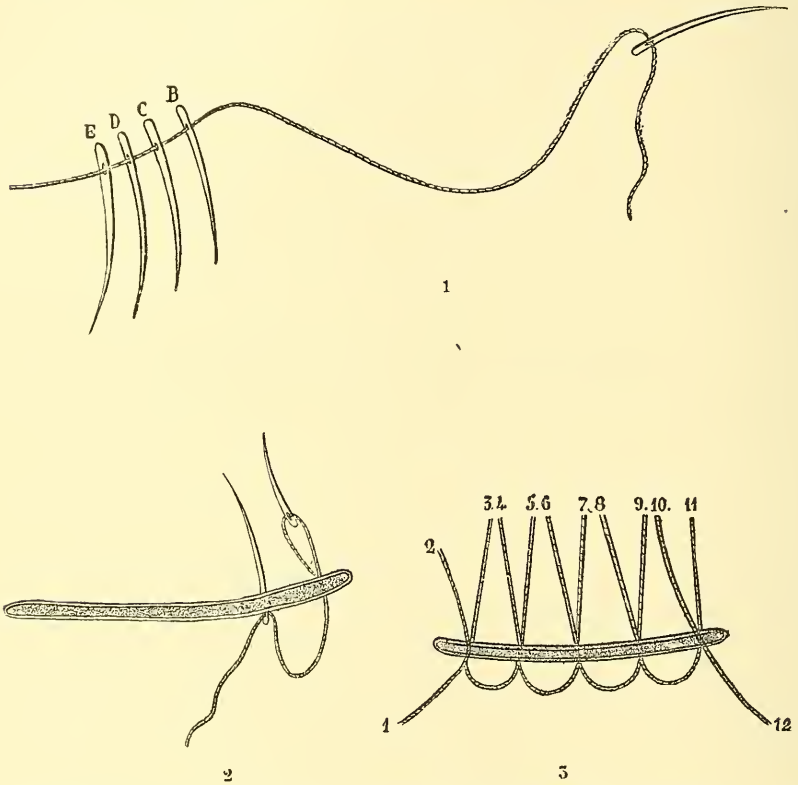

Fig. 39.—Chain Suture with a Series of Needles, Long's Process (of Asheville). 1. Series of needles threaded on one thread; 2. Insertion of first loop. Second needle transfixes the pedicle 3. All the loops in place.

Thomson has made a series of interesting experiments with the suture materials most in use for laparatomies. Carbolized catgut is absorbed in ten days; chromic acid catgut lasts for several months, as Sänger and Döderlein ascertained upon patients who survived Cæsarean section. Silk-worm gut was intact at the end of two months.[13] Silk is somewhat disorganized at the end of fifty days. The silk threads are at first infiltrated with a new cell growth, become encysted, and finally disappear, but this is a process which it takes several months to accomplish, and before that time they may play

the part of foreign bodies. The only explanation of this infection is the passage of germs through the intestines or the Fallopian tubes; unless, indeed, we admit the existence of a species of latent mi-

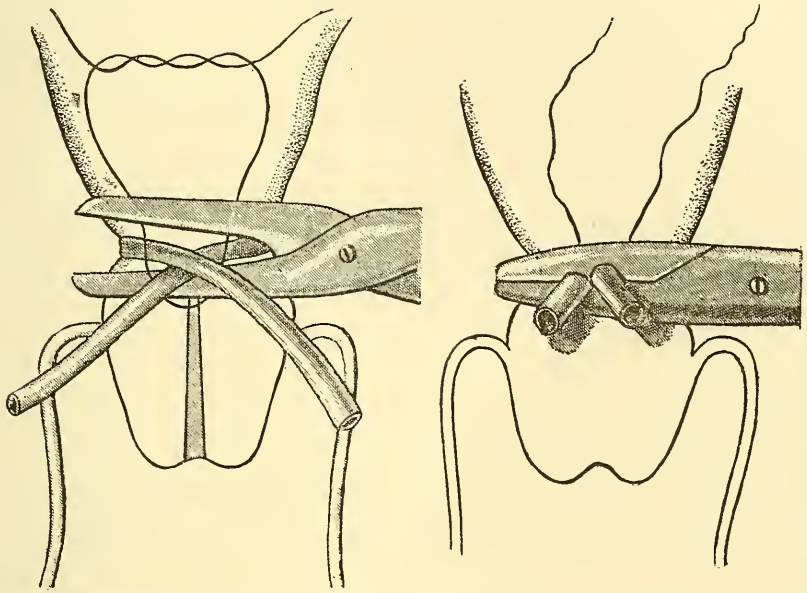

Fig. 40.—Hegar's Forceps Temporarily Holding an Elastic Ligature in Place, while a Permanent Ligature is being Adjusted.

crobism, called into activity by a vicious local or general condition.[1] To avoid infection when the cut surface of the pedicle may be septic (salpingitis, etc.) it is best to use catgut, or to use both cauterization

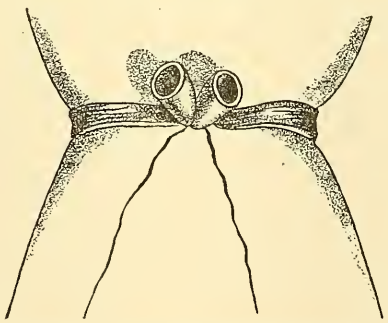

Fig. 41.—Elastic Ligature tied with Silk Thread (Hegar).

and ligature in mass. The aseptic slough produced by the hot iron is rapidly absorbed.

Kaltenbach[14] found in a subject who had died of tetanus eight days after the operation, that the cauterized surface was smooth, charred,

and showed no trace of inflammation. Heppner,[15] after an interval of two years, found the merest trace of animal charcoal in the neighborhood of the pedicle.

Of elastic ligature, buried or on a free surface, I shall here mention only a few general points, reserving technical details for the chapter on hysterectomy. It has, however, been used in the ligation of other than uterine pedicles. Hegar uses it in profusely bleeding ovariotomies. To keep the elastic cord in place, Olshausen ties it twice, and with a few additional silk stitches fastens it to the pedicle. Thiersch draws the ends through a leaden ring, which he then compresses. Hegar ties two silken ligatures around the elastic, at a little distance from each other (Figs. 40, 41, 42). Since I first introduced an instru-

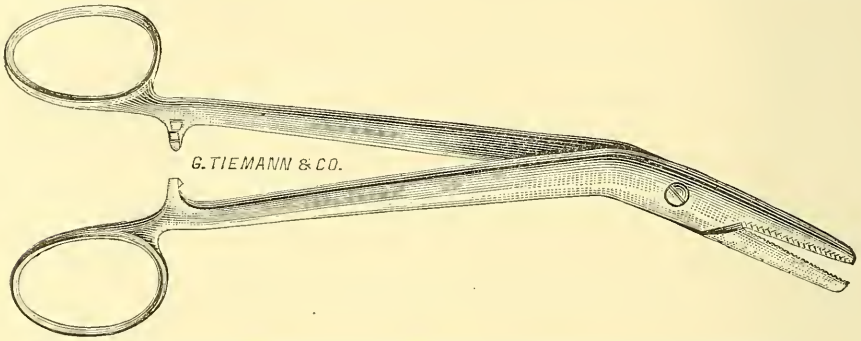

Fig. 42.—Hegar's Forceps for the Temporary Fixation of an Elastic Ligature.

ment for placing ligatures many modifications have been proposed, not only to facilitate the application of the cord, but also to keep it in place. I consider this last precaution superfluous, as two threads of silk fully accomplish the purpose without the intervention of any instrument. My ligator (Figs. 43, 44, 45,) which I introduced in the Surgical Society in 1883, and with improvements at the medical congress in 1885, is intended solely to facilitate the placing of an elastic ligature in a narrow space, as the pelvis or vagina. It is easily managed, and can be taken apart to insure perfect cleanliness. Collin's device (Fig. 46, 1) is a simplification of my instrument, and lends itself less readily to the tightening of the elastic loop after this is in place. The ligators of Terrillon and Segond [16] (Fig. 45, 1, 2) are excellent for holding the ligature, which, indeed, is all they aim to do, but they are of little use in facilitating the introduction of the ligature, which, it seems to me, should be the chief function of the instrument. For temporary ligatures they are not much of an improvement on

Hegar's forceps (Fig. 42) or Walcher's clamp [17] (Fig. 46, 2), and for permanent ligatures I have already said that two silk threads are better.

Forcipressure.—The process of obtaining hæmostasis by the temporary or permanent application of forceps is of ancient date. For a long time Charrière, the well-known manufacturer of instruments, attempted to induce surgeons to adopt forcipressure. In his catalogue,

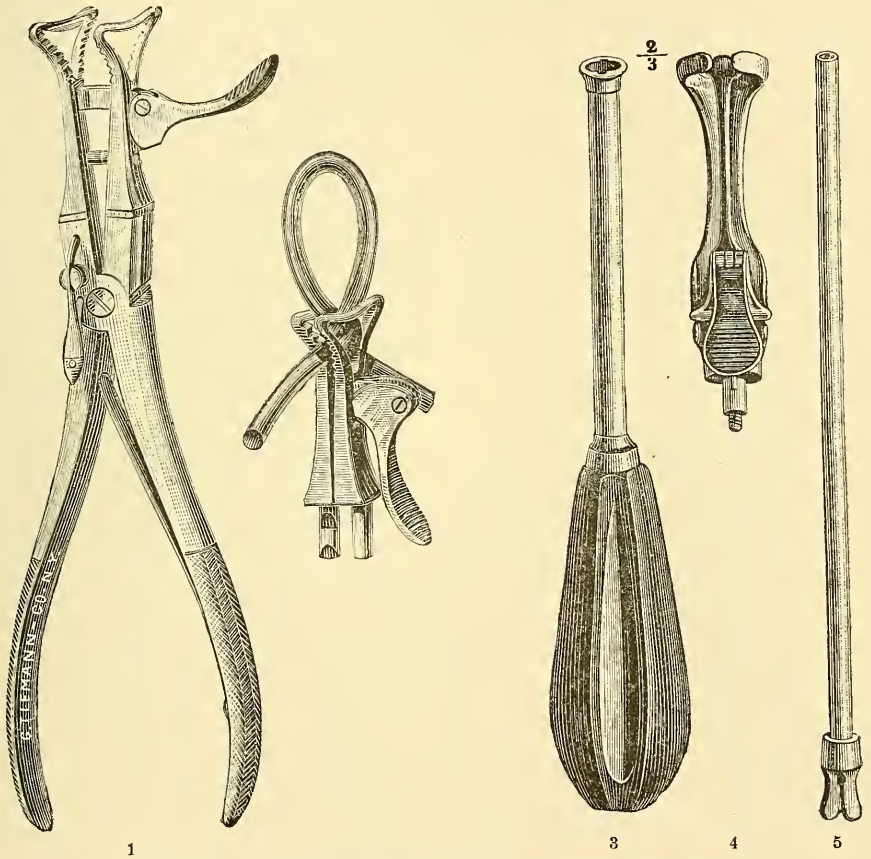

FIG. 43.—1, 2, Segond's elastic ligator; 3, 4, 5, Pozzi's ligator taken apart.

published the 15th of April, 1851 (printed by Thunot, Rue Racine), p. 11, Fig. 53, he shows forceps almost identical with the Koeberlé-Péan forcipressure instrument. It is thus described in the text: "Ring-forceps, with crossed and uncrossed handles, Charrière's model, designed to seize insects and reptiles in narrow spaces. These same forceps can be made with our ratchet catch which keeps them firmly closed when desired." In 1859, in another edition of his catalogue (Plon, printer), p. 6, Charrière has a paragraph upon the methods of

fixation by, 1st, the two handles of the polypus and œsophageal ring-forceps, and hooked forceps. 2. Artery forceps. He describes the

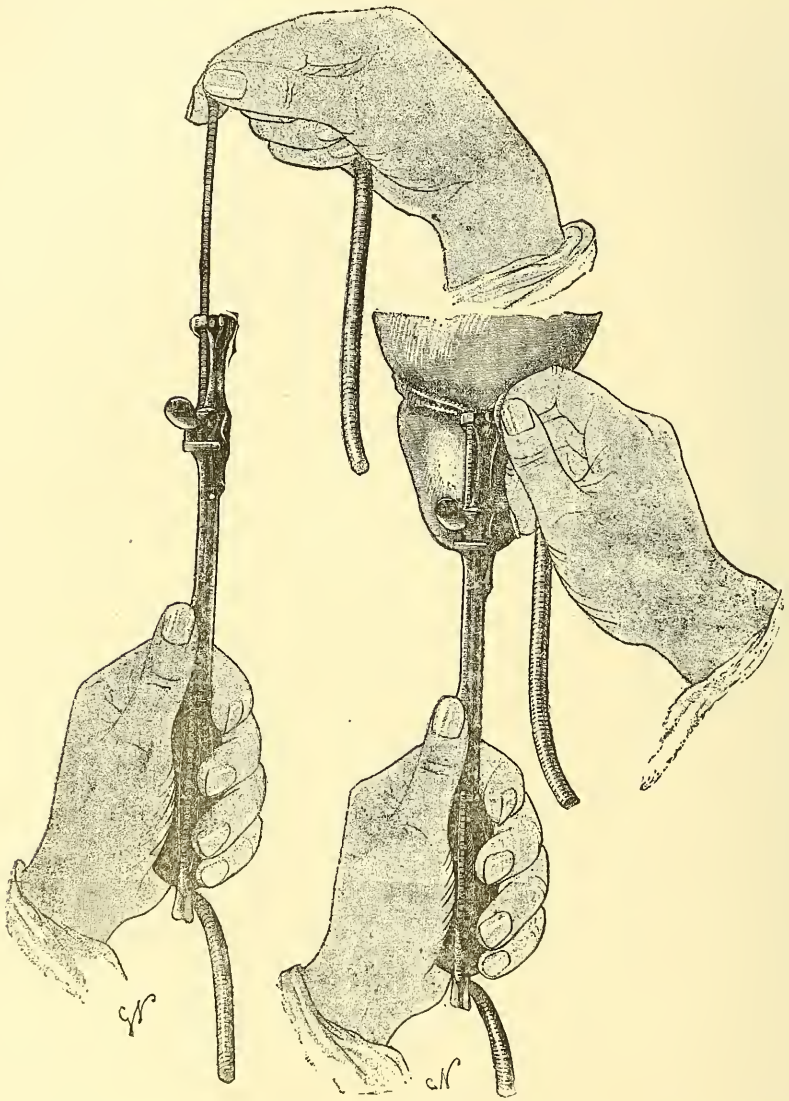

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FIG. 44.—APPLICATION OF POZZI'S ELASTIC LIGATURE. 1, First Step. The lower part of the elastic cord is held in the furrow while the cord passing under the open clamp is engaged by pressure in the head of the instrument; 2, second step. The cord has been twice passed around the pedicle, then again engaged by pressure in the head of the instrument.

insertion of a screw on the one blade into a hole on the second blade, and adds: "This system, which transforms a ring or dressing forceps (so called awhile ago) into a continuous pressure forceps, will permit

the carrying of needles into deep cavities, . . . and the pressure upon vessels to prevent hemorrhages during operation." True, Charrière had in mind only a temporary hæmostasis, for he adds: "The conical

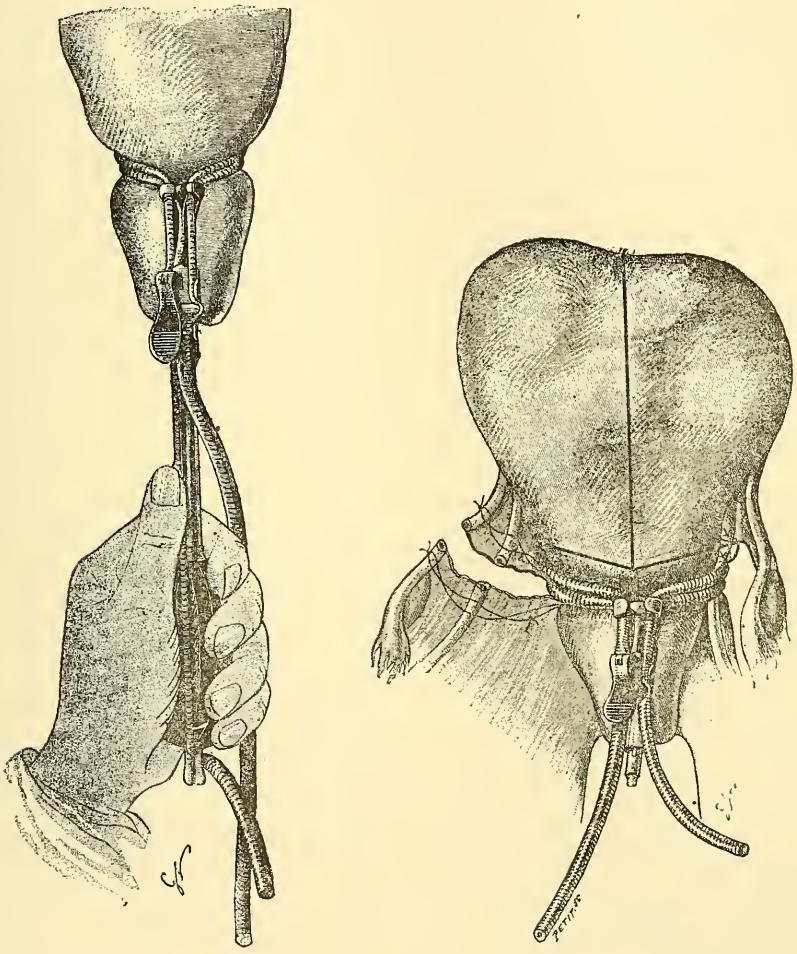

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FIG. 45.—APPLICATION OF POZZI'S ELASTIC LIGATURE. 1, Third Step. The elastic cord drawn under the clamp is held in place by it; 2, fourth step, the lower part of the cord is disengaged from the furrow; the instrument is taken apart by unscrewing the lower part of the shank on a level with the upper part of the groove. Only the head of the instrument remains temporarily in place. (At the left is a representation of the chain suture of the broad ligament.)

shape of the jaws will enable one to apply the ligatures deeply on the vessels." Nevertheless, he realized the immense value of these forceps in temporary hæmostasis, and dwells upon it again in Menier's "Commercial Catalogue," 5th edition, 1860 (Plon, printer). On page 276,

Fig. 18, he shows his ring and continuous pressure forceps, with this remark: "1. This instrument is of use as an ordinary dressing forceps. 2. The elasticity of its blades permits the secure seizure of arteries during hemorrhage, etc."

I have thought it advisable to quote from these documents which are unknown to the majority of persons who have discussed the question of priority in this matter. It certainly proves that the instrument which was destined a few years later to play so large a part in surgery, had been manufactured by Charrière in 1851 for another purpose, and in 1859 pointed out by him as applicable to forcipressure.

This method was, however, only occasionally used, until Koeberlé and Péan adopted it to save time in major abdominal operations. The question as to which of these two preceded the other in its use, has given rise to a discussion of some acerbity, from the consideration of which, however, it is difficult to reach any conclusion. Koeberlé[18] had a Strasburg instrument maker, Elser, manufacture for his use some forceps very like Charrière's dressing forceps, with a catch to allow of graduated pressure of the tissues. He has made constant use of it for rapid forcipressure, and very rarely resorts to ligature; this is evidenced by a description published by Revillout[19] of the operative procedures of the Strasburg surgeon, and by one published by Koeberlé himself shortly after.[20] He speedily applied it to all operations. Péan[21] in the beginning used, as Koeberlé did also, the larger serres-fines of Sedillot, known as serres-fortes,[22] but in 1868 had Guéride manufacture for him some forceps for forcipressure. They were of various kinds, convenient to use, and may be seen in the catalogue of that instrument maker. The sharpest point in the discussion, and the one upon which it is most difficult to form a just opinion, is this: Did Péan, as Koeberlé asserts, adopt, with or without alteration, the process first described by Revillout? or did Péan, as he himself declares, from the same operative needs, devise the same procedure as his colleague of Strasburg? This would be a very natural occurrence surely, but however that may be, Péan, the original or contemporary inventor of forcipressure, has, through his hospital positions and large private practice in Paris, done more than any other one man toward its general adoption.

Verneuil,[23] who in his remarkable paper has given the history of the application of forcipressure to hæmostasis, also helped to popularize and regulate its use. It is at the present day used in general surgery as well as in gynæcology.[24]

The popularizing of this valuable method of hæmostasis is due to Koeberlé in the first place, to Péan, and finally to Verneuil.

In England, Spencer Wells has become an enthusiastic apostle of the process, and its use is now general.[25]

The use of forcipressure during an operation is of great value, not only for the immediate arrest of bleeding, but because the temporary

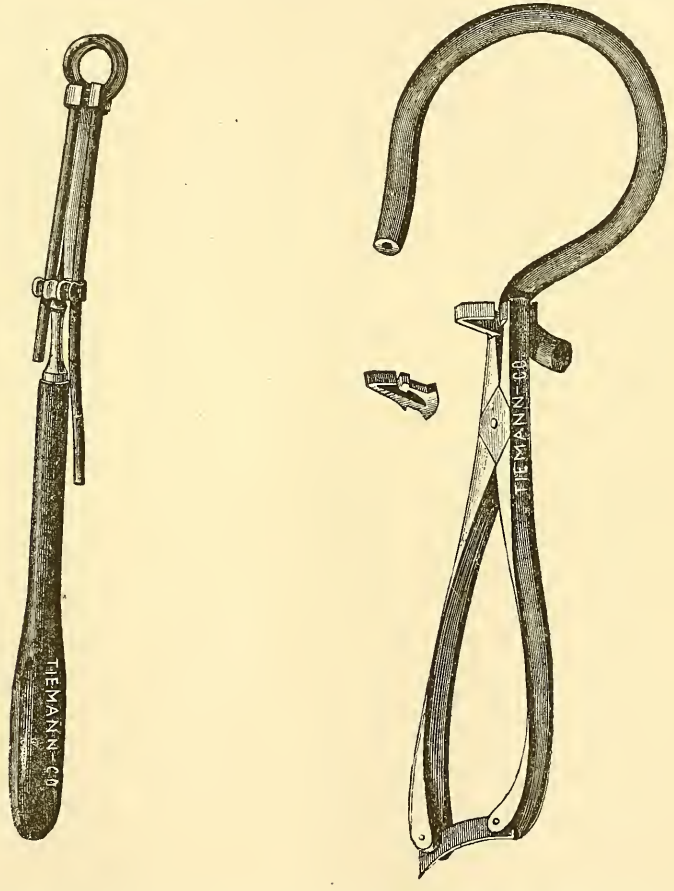

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FIG. 46.—1, Collin's elastic ligature-carrier; 2, Walcher's clamp for fixing the elastic ligature.

hæmostasis effected by it, nearly always becomes permanent. One may by its means perform a laparatomy without once being interrupted to tie an artery.

In plastic operations the use of this method must not be carried to excess, for the pinching to which some portions of tissue are subjected by the forceps is an obstacle to immediate union.

Forcipressure, as well as ligature, may be divided into that which compresses the vessels alone, and that which includes in its compression a large amount of tissue. This temporary constriction is a great adjuvant to permanent hæmostasis. It is desirable to have on hand forceps of various kinds, from Billroth's enormous instrument, suitable for the compression of fleshy pedicles, to the many styles invented or modified by Koeberlé, Péan, Terrier, Spencer Wells, Tait, Thornton, etc. In the majority of cases, forcipressure is resorted to as a tempo-

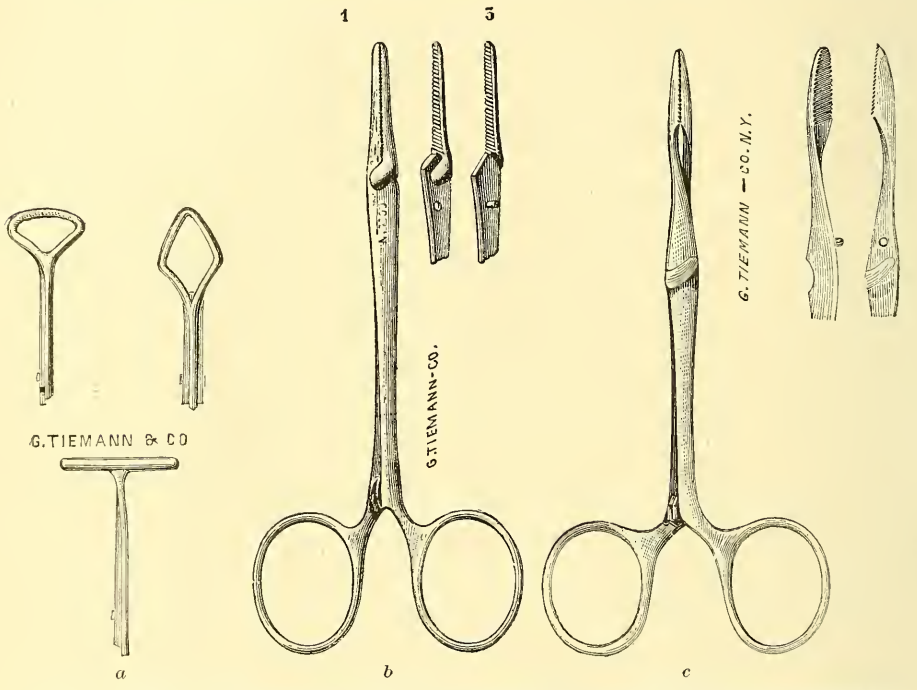

Fig. 47.—Koeberlé's Hæmostatic Forceps with Ratchet Catch Allowing Graduated Pressure for Forcible Compression; *a*, various forms of jaws for pressure forceps (Péan); *b*, Lawson Tait's pressure forceps; *c*, Péan's hemostatic forceps with Collin's joint.

rary measure; nevertheless, in cases of necessity, it has been utilized for the permanent arrest of hemorrhage. Péan leaves the forceps in the peritoneal cavity after abdominal hysterectomy, gathering the handles into a bundle at the lower extremity of the wound; this process is, however, inferior to the use of buried elastic ligatures.

Forcipressure has been used by many surgeons as a matter of necessity in vaginal hysterectomy (Péan, Buffet, J. Boeckel, Ch. Jennings), but it remained for Spencer Wells [26] and Jennings [27] to suggest its use as a matter of choice, and for Richelot to systematically adopt

it as such, even where ligature would be easier and, seemingly, preferable. Many surgeons now do the same. I shall return to this subject in the chapter upon uterine cancer.[48] I would only observe in this connection that hæmostasis by permanent forcipressure, when in mass, is always followed by the death of a much greater amount of

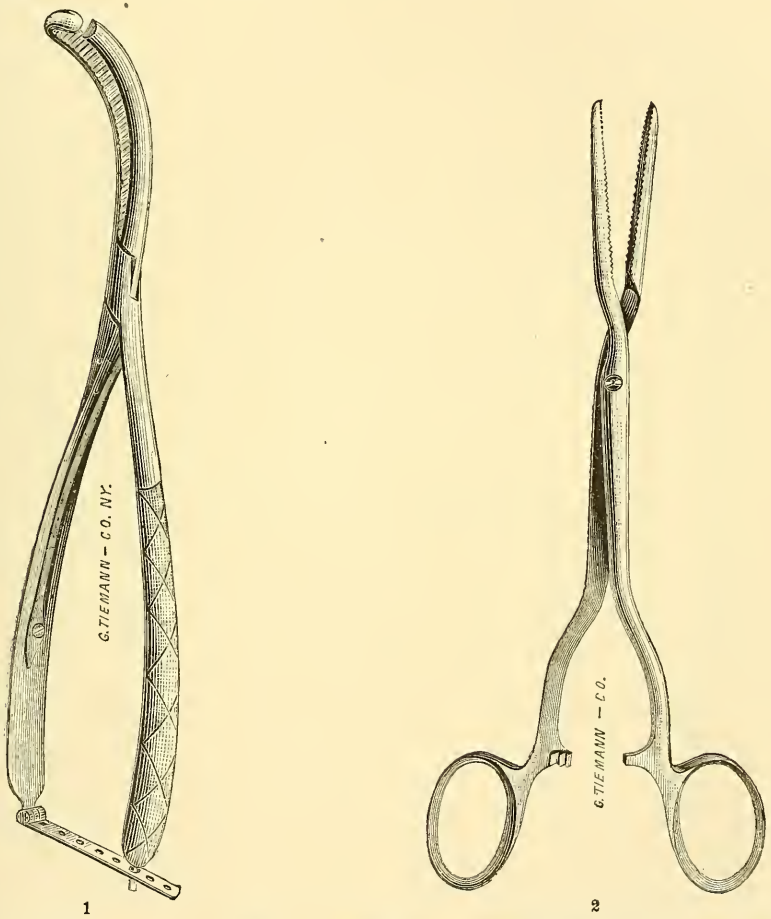

FIG. 48.—1, Billroth's forceps for the compression of fleshy pedicles (hysterectomy). Medium size, one-fifth actual size; 2, Spencer Wells' forceps for forcipressure in mass of pedicles (ovariotomies).

tissue than when applied to isolated ligature. From the antiseptic point of view, it is inferior to ligature.

Drainage.—This is not the place to discuss the indications for drainage, whether of reunited superficial wounds or of the peritoneal cavity. I would simply establish a few general principles and point out the practical methods for their application.

Drainage of Wounds.—In a suture in layers (étages) of the abdominal cavity after laparatomy, it is usually not necessary to place a drainage tube between each series of stitches. Yet it is well to do so if the surface of the cut has been exposed to infection, for instance, from pus; for in this case, notwithstanding the most energetic aseptic

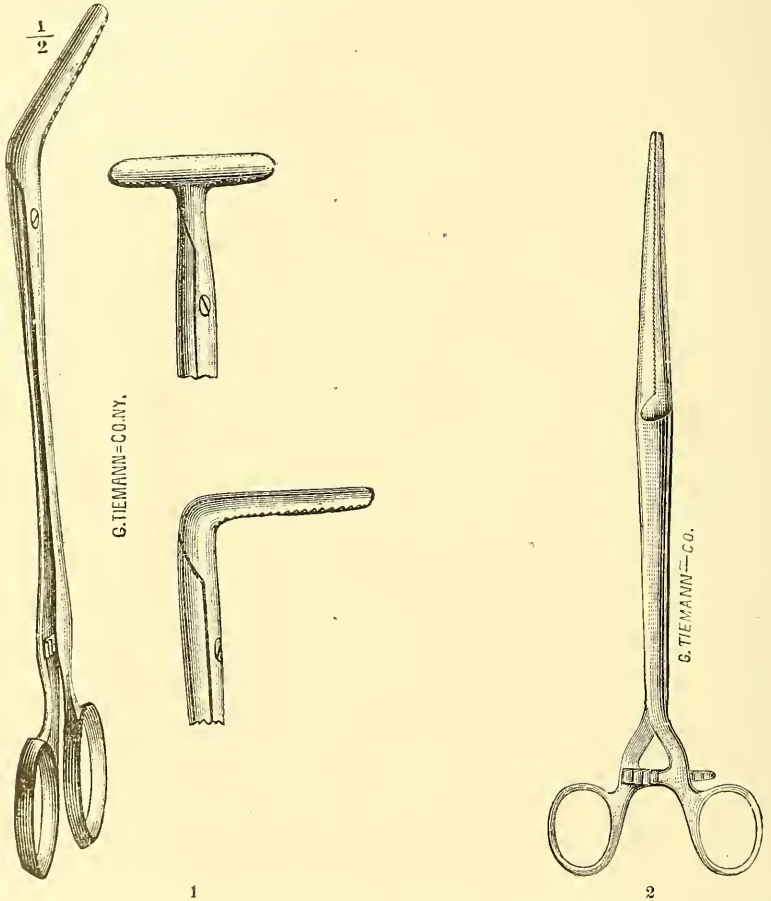

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FIG. 49.—1, Thornton's instrument for forcipressure in mass (ovariotomy); 2, The Péan-Terrier-Collin forceps for forcipressure in mass (adhesions).

washings, a serous or sero-purulent exudation may supervene and unless it is promptly carried off by prophylactic drainage, may interfere with primary union. Under these circumstances it is advisable to place a small drainage tube between the aponeurotic and cutaneous sutures; this tube should be divided into three segments, and a safety-pin transfixing the outer end will prevent its being lost in the wound. In the hospital at Pesth, I have seen used in place of the

pin, a small flat piece of hard-rubber sewed to the end of the tube with two lateral stitches.

The best drainage tubes are of thick rubber, uniting elasticity which keeps them open, to a flexibility which permits of bending them as required.

It is not necessary to use glass or hard-rubber tubes if the soft ones at hand are of sufficient thickness and good quality.

Drainage of the Peritoneal Cavity.—From the earliest days of laparatomy, this has been done to prevent the accumulation of liquids (blood, ascitic fluid, more or less septic serum, etc.). Peaslee, in 1855, first pointed out the necessity for it. He used an elastic catheter which penetrated into the pouch of Douglas and emerged through the vagina. Koeberlé, in 1867, drained through the abdominal wound by

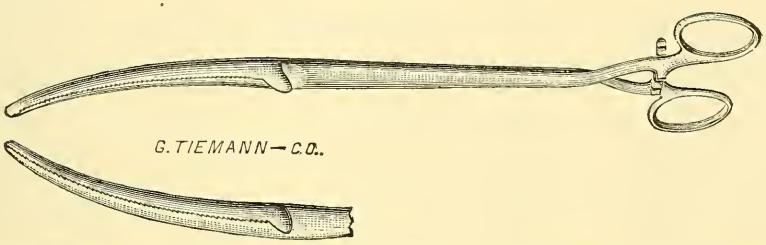

Fig. 50.—Instrument for Forcipressure in Mass, Curved-Laterally for Vaginal Hysterectomy (Péan and Richelot).

means of a glass tube terminating in a bulb, and perforated at intervals in its entire length with small openings. The two directions to be taken in peritoneal drainage were from that time determined. But the debatable ground, then and now, is the indication for drainage. Sims, in 1872, recommended systematic drainage after every ovariotomy. This exaggerated view at least showed the harmlessness of drainage when attended with proper precautions. It is well to bear in mind that, at the end of a few hours, the tube is surrounded and, in a measure, isolated by a newly formed pseudo-membrane. Only a persistent oozing in the abdomen will cause the formation of a cavity at the end of the tube in which fluids accumulate.

The problem has been further simplified by the recognition of the great absorptive powers of the peritoneum when this physiological function is not interfered with by extensive or ragged wounds, or by long exposure to the air and paralysis of the intestines. Consequently in a laparatomy uncomplicated by the above conditions, a large amount of blood or serous fluid may be rapidly absorbed without injury to the patient.

Chénieux[29] asserts that this absorption is more beneficial than evacuation, and we would scarcely wish to contradict him. The difficulty consists in knowing when it will occur; if it does not occur at all, septicæmia is more likely to follow. I have said in a preceding chapter that washing the peritoneum temporarily interferes with its absorptive powers.

(Wegener,[30] basing his conclusions upon experiments with dogs

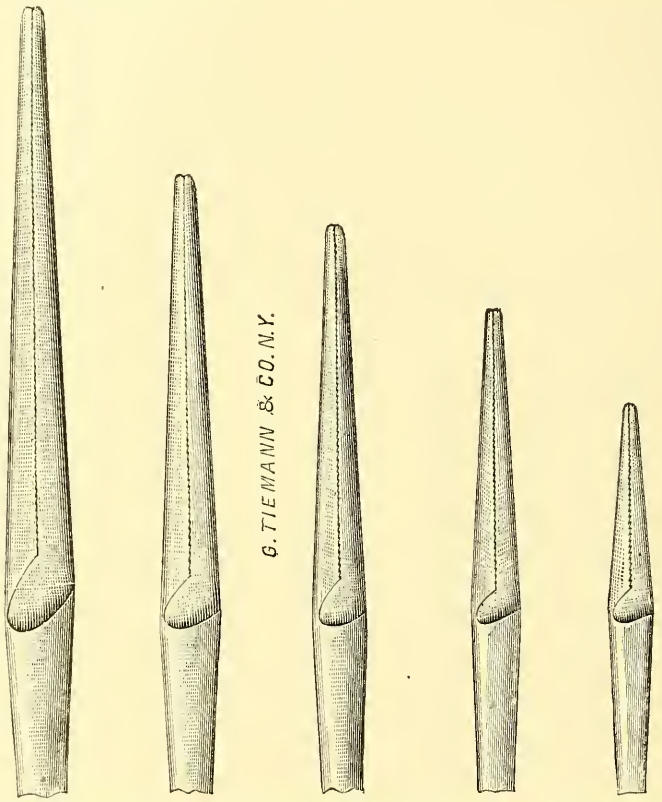

Fig. 51.—Instruments of Several Sizes for Forcipressure in Mass (Adhesions) with Collin's Joint. Natural size.

and rabbits, estimates the absorptive powers of the peritoneum in man at two and a half quarts an hour; toxic injections have as rapid action as if introduced directly into the blood-vessels.)

The "toilet" of the peritoneum having been properly accomplished, after a laparatomy, by means of gauze sponges introduced by the finger or long forceps into all dependent portions, there is nothing to fear from what is left in the abdomen, but purely from what may come later and remain there. Each and every surgeon must judge

for himself what constitute indications for drainage, it being manifestly impossible to lay down strict laws; yet we may formulate the principal indications.

1. Abundant parenchymatous oozing of blood or serum after closure of the abdominal walls, the absorbing power of the peritoneum being impaired by special anatomical or clinical conditions. Drainage, in this case, as Tait observes, serves not only to carry off the fluid, but possesses hæmostatic action as well.

2. The existence in the peritoneal cavity of a septic body (shred of a cyst wall, suppurating surface) which would occasion the formation of fluid whose absorption would be harmful; lesions of the peritoneum.

3. Large tear of the peritoneum acting in two ways, (*a*) as a source of persistent oozing, (*b*) as an obstacle to normal absorption.

4. Long duration of the operation and manipulation compromising the tonicity of the intestinal walls and the vitality of their serous covering.

Drainage through the Vagina.—The cul-de-sac of Douglas being the most dependent portion of the pelvic cavity, it seems reasonable to utilize it for the purpose of draining. Moreover, by its use we avert the danger of weakening the abdominal walls, and thus favoring the occurrence of a hernia by delay in union at any point. The only objection to be raised against the vagina as a canal for drainage is the fact that antisepsis is rendered more difficult by the large number of micro-organisms always present in the genital tract.

Without dwelling upon inefficient or complicated[31] methods of drainage, I shall describe the one that seems to me of the most value. It consists in the introduction of a cross-shaped tube formed of two rubber tubes firmly united. (This may be done with silk sutures, but there is danger of secondary infection.) After a laparatomy this tube may be inserted through an incision in the posterior cul-de-sac, or directly by puncture with a large trocar, or better still, with Wölfler's forceps.

I have seen them inserted by A. Martin without previous puncture of the tissue, the transverse arms of the tube were held folded in the teeth of the forceps—the surgeon placed two fingers in the pouch of Douglas, and while the cervix was held down by an assistant, who at the same time administered a vaginal antiseptic injection, the operator forcibly pushed the forceps behind the cervix into the posterior cul-de-sac, bursting through its walls and carrying the tube into the

abdomen between the guiding and supporting fingers. The inventor of this process claims that rapidity of action is secured and danger of hemorrhage or of wounding the rectum is averted. For my part I prefer the cautious use of Wölfler's forceps (Fig. 52). The transverse

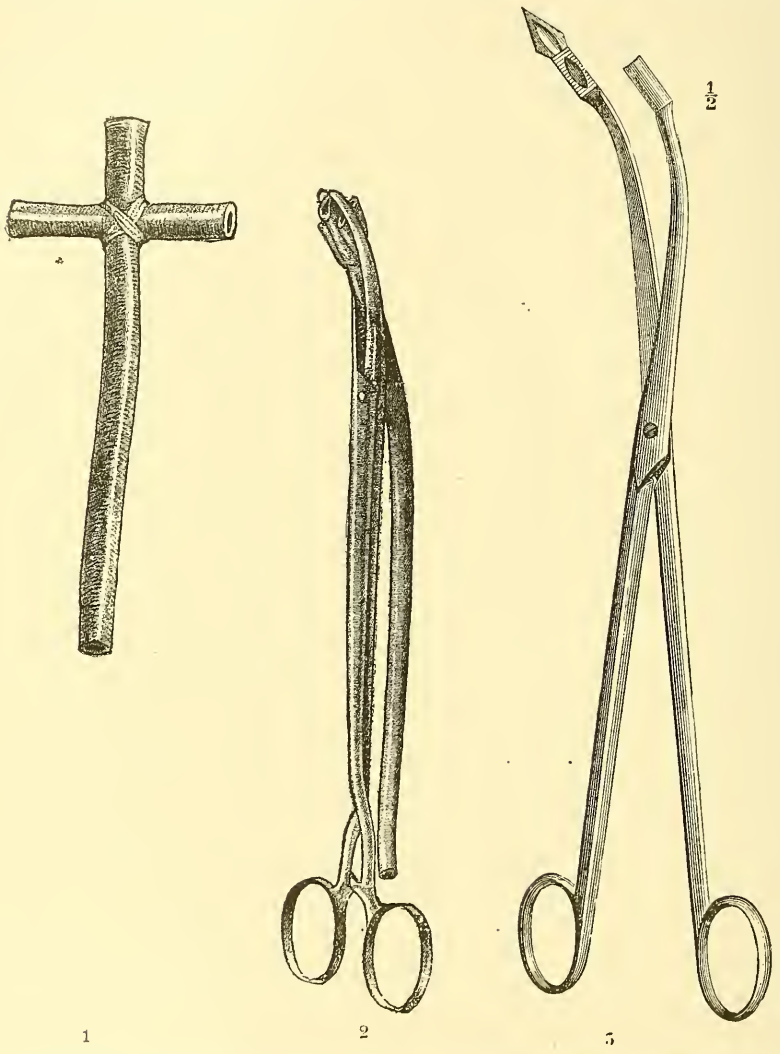

Fig. 52.—1, Rubber cross-shaped drainage tube for draining cavities; 2, method of seizing the tube in the forceps for insertion in a cavity; 3, Wölfler's forceps for introducing tubes by transfixion.

arm of the tube is held securely in place and yet in such a way that it can be taken out, when necessary, by strong traction. The vaginal extremity should be wrapped in iodoform gauze. Unless special indications call for longer drainage, it is left in place eight or ten days

at most. A feeling of discomfort in the abdomen warns us when the tube ceases to be tolerated. As a matter of prudence, it is better to administer no injections either through the tube or in the vagina while the tube is in place; exuded fluids can be absorbed by gently pushing iodoform gauze into the vagina.[32]

Drainage through the abdominal walls has hitherto been done

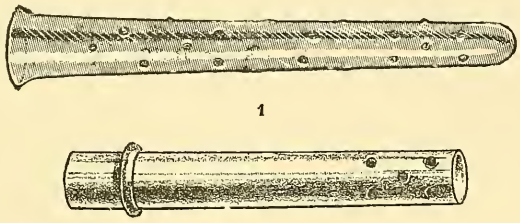

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Fig. 53.—Tubes for Peritoneal Drainage; 1, Koeberlé's tube; 2, Keith's tube.

chiefly with glass tubes. It is advisable to have an opening only at the inner end. This is inserted into the cul-de-sac of Douglas and the upper extremity emerges from the abdomen into an absorbent dressing. Lawson Tait uses a special sort of cupping-glass to pump out fluid. Koeberlé,[33] as early as 1867, filled the canula with pledgets of carbolized cotton to absorb the fluid. Hegar[34] adopted this process,

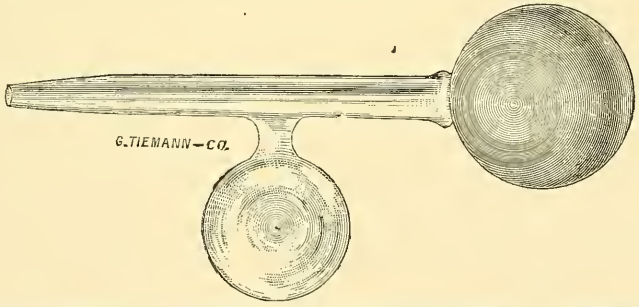

Fig. 54.—Tait's Cupping Glass for the Aspiration of Fluids through a Glass Drainage Tube.

with improvements, bringing into play the capillarity of the absorptive substances contained in the canula, which were frequently renewed. He finally changed the canula into a large abdominal speculum (Bauch speculum) of glass or hard rubber, one or two inches in diameter and seven inches long, filled in his earlier experiments with carbolized cotton, later with iodoform gauze. On the first day this is renewed every hour, then every two hours, and finally every four hours. Hegar has since abandoned this method for that of capillary drainage by

means of iodoform gauze only. It is evident, then, that capillary drainage has for some time been an auxiliary to tubular drainage through an abdominal opening; it counteracts the injurious effects of pressure far better than Nussbaum's method of turning the patient upon the side or the abdomen. The credit of reducing to a system what was previously a more or less empirical process, is due to Kehrer.[35] He proposed the use of lamp-wick about as thick as the little finger, thoroughly disinfected by boiling in a five-per-cent carbolic solution; in practice, however, it is usual to immerse the wick in iodoform ether, and then thoroughly dry it.

Since the publication of Kehrer's article, antiseptic lamp-wick, iodoformed or carbolized, has been extensively used in Germany, both in gynæcological operations and in general surgery. Breisky has long used it for drainage, after vaginal hysterectomy for uterine cancer. Billroth used it for several purposes, but seems now to prefer strips of iodoform gauze. Nevertheless the lamp-wick has recently come into favor again. Gersuny[36] considers its absorptive powers greater than those of gauze, and Chrobak[37] took the trouble to demonstrate its superiority by means of comparative experiments. He used it in draining after ovariotomy and supra-vaginal hysterectomy. Yet operators of no less authority than Hegar, Mikulicz, etc., affirm that the absorptive powers of gauze are all sufficient, and that, other things being equal, it is best to avoid multiplying the number of materials used for dressings. The indications for simple capillary drainage of the peritoneum, as distinguished from the combination of it with tamponing, to which I shall shortly allude, are, I believe, very few. For my part, I use it only after vaginal hysterectomy. Instead of inserting one or two tubes into the peritoneal opening, or leaving it quite open as do many surgeons, I prefer to reduce the size of the wound by a few lateral sutures and push in, to the depth of about a finger, a large strip of iodoform gauze doubled upon itself, its two ends tucked into the vagina and easily recognized by a thread tied about them. At varying intervals, depending upon the amount of exudation, the other pieces of iodoform gauze which complete the intra-vaginal dressing are renewed, but the strip in Douglas' pouch is left in place as a drain and only removed after a lapse of six or eight days.

Antiseptic Tamponade of the Peritoneum.—It was a bold step to stuff antiseptic pledgets into a portion of the peritoneal cavity so as to isolate it from the remainder of the serous membrane. This isolation is produced in the first few hours by the tampon barrier alone,

later by the adhesions formed at its periphery. This audacious proceeding was suggested by the success following the tamponade of wounds which replaced drainage in Kocher and Bergmann's practice.[38] The second step was Hegar's[39] use, in the opening of pelvic abscess, of a process founded upon Volkmann's method of opening hepatic abscess. Finally tamponade of the peritoneum itself was recommended by Mikulicz.[40] It has been used in Germany and in America,[41] but I can find no record of its use in England, and in France[42] I was the first to describe and make use of it.

Method of Application.—Mikulicz advises the insertion, in the first place, in the cavity to be tamponed, of a pocket formed by stuffing in a piece of 20% iodoform gauze. To the centre of this piece of gauze is attached an antiseptic, double silk thread by means of which it may later be withdrawn. To save time, this should be arranged before the operation; the gauze when in place looks like a tobacco pouch; five or six long strips of iodoform gauze are now stuffed in and spread over the whole surface of the cavity, their ends project from the gauze pouch, and with it emerge from the lower extremity of the abdominal wound (Fig. 55). This process may be simplified by merely pushing the strips of gauze directly into the cavity, if that cavity be small or tortuous—but one must take care that the gauze has no loose threads upon its edges.

It is well to insert a large drainage tube at the same time; this will give central support to the tamponing and prevent the accumulation below of fluids too dense to filter through the gauze.

I also advise that all iodoform powder be removed from the gauze by thoroughly beating it, for I have occasionally seen signs of mild iodoform poisoning. It is well, also, to attach threads of different color to the various strips of gauze, so as to know which ones to take out first.

How long should the tampons be left in place? Mikulicz says the strips of gauze should not be removed under forty-eight hours, and the bag itself three or four days later. One should be guided by the amount of oozing, and the condition of the parts to which tampons have been applied. At all events, the pouch should not be taken out before the fifth day, so that the peripheric adhesions may become firm enough to be safe from all danger of tearing. It is easy enough to remove the strips of gauze, if you follow my advice and put on some mark by which they may be distinguished and removed in consecutive order. Otherwise their extraction may be difficult and cause

injury. Gluck has recently proposed the use of tampons which can be absorbed, as catgut, etc. This seems to me a theoretical idea incapable of practical application.[43] Though it be necessary to leave the tampons in place long enough to permit of the formation of plastic, aseptic inflammatory adhesions surrounding and circumscribing it, it is self-evident that the external dressings should be changed as often as necessary—or about three times a day. The serum secreted at the depth of the wound and transmitted by capil-

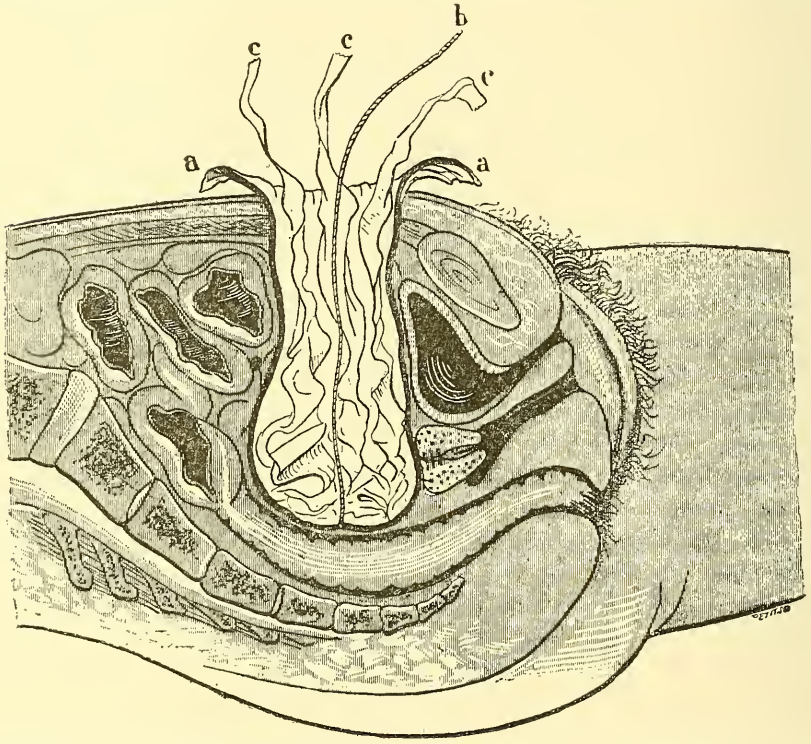

FIG. 55.—TAMPONADE OF THE PERITONEAL CAVITY AFTER HYSTERECTOMY. *a a*, Pouch of iodofor gauze; *b*, silk thread fastened to centre of pouch; *c c*, strips of iodoform gauze.

lary drainage through the tampons is very rapidly absorbed by this external dressing.

It is no more possible to lay down an absolute rule in reference to cases demanding the use of tampons than it was in the case of drainage. Much is necessarily left to the judgment of the operator. Tamponade should certainly be reserved for exceptional use, an *ultima ratio*, either for parenchymatous oozing (hæmostatic tamponade) or in case of threatened septic infection (protective antiseptic tamponade). In the latter case, two different conditions may exist.

A. A part of the wound is already septic at the time of operation, and on account of the presence of septic tissue which cannot be removed without danger, or of the large effusion of pus and septic fluid, irrigation and cleansing seem to produce no effect.

B. The danger of infection occurs after closure of the abdominal wound, and is due to the falling apart of a badly-made suture, or to perforation of some organ affected before or by the operation (intestines, bladder). In either case, I have obtained good results from an antiseptic tamponade. [This method is also valuable and most often used in cases where, for any reason, such as the presence of universal adhesions or because of anatomical relations, it is impossible to complete the removal of any abdominal or pelvic cyst. In these cases, after stripping off, if possible, the lining membrane of the sac, the cavity is stuffed, as described, with an iodoform gauze pouch filled with plain gauze to lessen the risk of iodoform poisoning. This is allowed to remain *in situ* for from forty-eight to sixty-four hours or longer if there be no rise of temperature, when it is removed and the cavity repacked if necessary. The cyst cavity rapidly shrinks and soon becomes a granulating surface, which after a time becomes obliterated.]

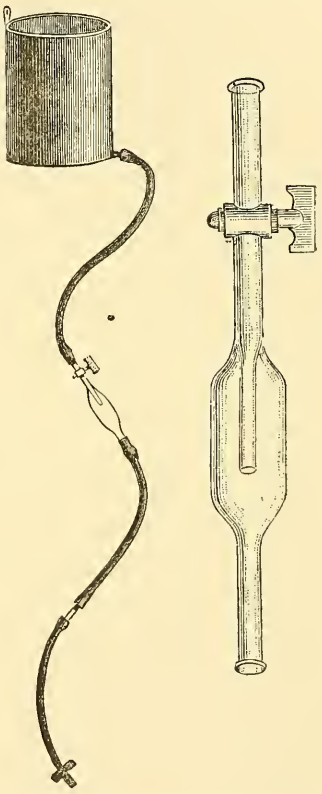

FIG. 56.—1. Apparatus Connected with a Cross-tube for Continuous Irrigation of the Uterine Cavity or Vagina; 2. Schücking's Minim-dropper.

Intra-uterine Drainage. — Capillary drainage of the uterus by means of thin strips of iodoform gauze successively pushed into place with a sound, is used as a preventive of infection from uterine catarrh.[44] These strips are removed at the end of twenty-four hours and replaced with fresh gauze, a procedure easily accomplished because of the increased dilatation of the cavity. Should the uterine cavity need thorough disinfection, the drainage or tamponing may be conducted in a very similar manner to that which I have described for the peritoneal cavity.

Langenbuch, Theide, and Schede have used a drainage-tube closed

at the upper extremity, but perforated with holes in the intra-uterine portion. By its aid one can make frequent injections into the uterus, but it is a mistake to think that the mucus will be carried off. It is too thick to go through the small apertures; the tube, moreover, is kept in place with difficulty. It is a bad method, and may even cause intra-uterine infection instead of preventing it. The case is altered when the uterus is sufficiently dilated to allow of the insertion of a large cross-tube, which is a far better instrument than the metallic ones which have been recommended (Sevastopoulo) but which are likely to injure the uterus. It is both easier to introduce and keep in place, and safer in its use; and is of especial value when a permanent source of infection exists in the dilated uterus, as a sloughing shred from a fibroid, or a piece of fœtal membrane which has evaded curetting. When necessary, this drainage can precede continuous irrigation, and in any case it facilitates the evacuation of concealed fluids and the frequent administration of intra-uterine injections.

Continuous Irrigation.—The following is my method of applying it:

The arms of the crossed drainage tube are doubled up in the forceps and inserted (Fig. 52, 2) into the uterine cavity, which having already been dilated, offers no obstruction. As a preliminary, you rapidly introduce two or three pints of a strong antiseptic solution (3:1,000 of carbolic, $\frac{1}{2}$:1,000 of bichloride), then begin the irrigation to the full capacity of the canal, and finally, drop by drop, either by the use of an ordinary stop-cock, or Schücking's minim-dropper. The solution used should now be weaker (ten per cent carbolic, one-fiftieth per cent bichloride), and should be maintained at a temperature of 95° to 100° F. This drainage and irrigation may be left in place several days, but should be removed every two hours and cleansed (Fig. 56).

The patient is to be kept upon a rubber apparatus or sheet so arranged as to carry the fluid into a receptacle placed upon the floor by the bedside (Figs. 5 and 6). The buttocks and genital organs are to be anointed with vaselin to prevent excoriation.[45]

Antiseptic tamponade of the uterine cavity was first used by Fritsch[46] in the dressing of certain cancers of the body of the uterus, and has proved of use to me in similar cases. Long strips of iodoform gauze are prepared and gently pushed into the uterus with some blunt instrument, as long and slightly-curved forceps, being packed in gradually, somewhat as a tooth is filled (to use Fritsch's expres-

sion). The gauze may be left in place from three to six days, and renewed from time to time until the disinfection is thoroughly accomplished. Intra-uterine tamponade may be hæmostatic as well as antiseptic; it is then well to use a gauze which is prepared with resin as well as iodoform: this can be made upon the spot when necessary by thoroughly dusting some Lister's gauze with iodoform powder. Very exceptionally one may add a few drops of the perchloride of iron after curetting a cancer or enucleating a fibroid. Such a tamponade, preceded by hot injections, and followed by the administration of ergot, may be of inestimable value. It has recently been applied to post-abortum and post-partum hemorrhages, and used in the treatment of uterine atony.[47]

Tamponade of the Vagina.—This must not be confounded with the mere insertion of tampons. To deserve the former appellation, the vagina should be filled through its whole extent with a column of a more or less elastic substance—lint, cotton, gauze, or wool—rendered aseptic and antiseptic by previous treatment. Various medicinal agents may be incorporated with it, but the tamponing is the chief object in view.

It may be used for two different purposes. 1. Hæmostatic; 2. antiphlogistic.

1. *Hæmostatic Tamponade.*—This is not a method adopted from choice, but from urgent necessity, a profuse metrorrhagia calling for immediate interference. To seek the cause and treat it directly is always best, but not always possible, and to gain time we resort to vaginal tamponade, inserting below the os uteri a large pledget of cotton which is permeated with great difficulty, and causes coagulation of the blood in the uterus. Emmet, to attain the same object, has had recourse to temporary suture of the external os. We must not forget that this is an expedient merely, and not treatment properly so called; danger would attend its protracted use, either from the hemorrhage itself, or from reflex reactive action caused by the foreign body in the vagina. But, bearing in mind the possibility of such an occurrence, the method is capable of rendering good service.

The old way of tamponing consisted in the introduction through a cylindrical or bivalve speculum of dry lint, arranged something like a kite-tail. This lint, filled with germs, was often left in place long enough to initiate infection. Since the era of antisepsis, lint has been replaced by cotton or gauze saturated with carbolic, salicylic, or boric acid, bichloride or iodoform. These materials are not, how-

ever, of equal value; dry absorbent cotton is even injurious owing to its permeability; well-packed gauze is so in a less degree, yet productive of harm unless previously well moistened.

That this little operation may be effective, I advise the following mode of procedure, bidding you bear well in mind that its use is rarely called for except in cases where life is endangered. We first assure ourselves that the rectum and bladder are empty. The best position for exposure of the whole vagina without fatigue to the patient, is the Sims' or lateral semi-prone position. The blade of a speculum depresses the posterior wall, and the entrance of air brings the parts into view. Irrigation with carbolized 1% solution will clear out clots and accumulated blood. For the tamponade I recommend the use of pledgets of cotton, a few of them saturated with a concentrated solution of alum, the greater number with the weak carbolic solution which has been used for irrigation. Just before using them, they are squeezed into the shape of flat discs about the diameter of a silver dollar and twice or three times as thick. With long forceps, five or six of the alum discs are rapidly packed around the cervix in the culs-de-sac, down to the level of the external os. When this is covered over, the tamponing is continued with the carbolized discs, squeezed as dry as possible.

It will be necessary to have a large number of these cotton pledgets, though they are not to be forcibly pressed into place, but simply inserted one upon the other so as to form a homogeneous mass. The speculum is gradually withdrawn as the discs are introduced, and will be entirely free just before the completion of the tamponing. As this cotton column may compress the neck of the bladder, it may be necessary to use the catheter from time to time. The tampons should not be left in place more than twenty-four hours; after their removal a hot douche is administered, and the tamponade is only repeated if absolutely necessary.

B. Antiphlogistic Tamponade.—The results aimed at by the inventors of the process of columning the vagina are: the mechanical uplifting of the uterus by relaxing the strain upon its ligaments, diminution of venous stasis due to its prolapse, the slowing of the arterial current by eccentric pressure on the parts; combating thus congestion and inflammation and bringing the tissues into a favorable condition for the reabsorption of exudations, and the cessation of pathological reflex phenomena. Bozemann [48] seems to have been the first to use both the name of "columning" and the process. Talia-

ferro[49] was the one to introduce it into general use. It is a popular method of treatment in America,[50] and the happy results obtained prove that it is worthy of serious consideration as a therapeutic measure, especially in the case of subacute or chronic perimetritis, subinvolution, etc. The following is the correct method of procedure. The best position in which to place the patient is the genu-pectoral; this permits of free access to the vagina, which is opened out by the in-rushing air. [This position is a disagreeable one for the patient, and practically equally good results may be obtained in the Sims' position.] One should have at hand, 1st, small pledgets of antiseptic absorbent cotton, soaked in glycerin and squeezed dry, 2d, pieces of fine wool, purified in a sterilizing oven, washed in a 1% carbolic solution and wiped dry; this substance is employed because of its elasticity. A tamponade composed entirely of absorbent cotton would be too compact; cotton from which the oil has not been expressed, although less elastic than wool, may conveniently replace it if necessary. Tampons or discs to be used are soaked in glycerin and squeezed out, then inserted in the posterior cul-de-sac, and surround the cervix, holding it firmly in place. The packing of the vagina is completed by filling it with well-carded wool or non-absorbent cotton almost to the vulvar opening. The patient should keep her bed for one or two days after the first tamponing, which is always applied more compactly than those which follow. Should an erythema supervene, it would be well to use only dry substances well covered with vaselin. The tamponade is renewed every two or three days, and to be effectual should be persisted in for several consecutive weeks or months.

One may produce a topical effect upon the vaginal mucous membrane by saturating the cotton or the wool with medicinal agents, as glycerole of tannin, etc., but when this is done, tamponing ceases to be tamponade and becomes merely a collection of tampons.

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CHAPTER IV.

METHODS OF GYNÆCOLOGICAL EXAMINATION.

The chief positions in which we are called upon to examine patients are the erect, the dorsal, the lateral, and the genu-pectoral.

Erect Position.—The vaginal touch with the patient standing affords only limited information, but is useful in cases of displace-

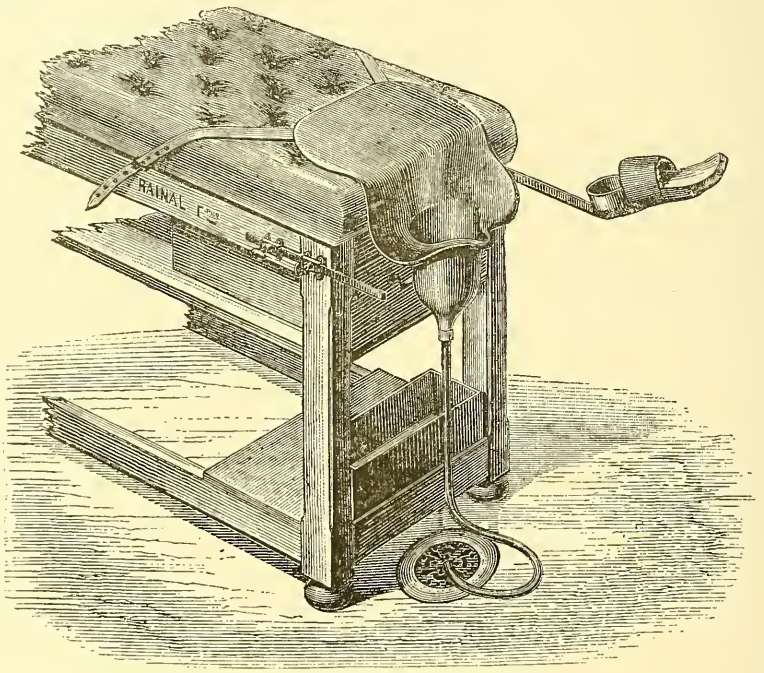
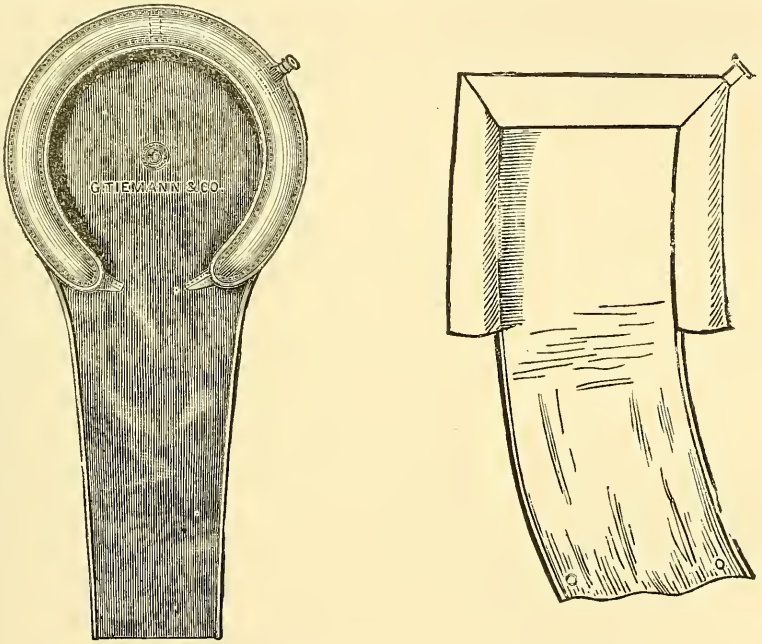


Fig. 57.—Metal Sheet for Continuous Irrigation (Lourcine).

ment of the pelvic organs and in abdominal tumors. It is not suitable for complete examination and deserves no further mention. [I cannot quite agree with the author in his estimate of the value of the examination in the erect position. Very many symptoms of pelvic disease are more marked or only noticed when the patient is on her feet and certain conditions of descent, prolapse, or displacement may entirely disappear or change when the intra-abdominal pressure is removed in

the dorsal or Sims' position. Further a pessary which seems to support a displaced uterus perfectly while the patient is recumbent may be found inadequate when she is erect. As these conditions cannot be certainly determined in any other manner, the value and often necessity of examination in this position is evident.] The examiner, standing mostly in front of the patient, places his left knee on the floor and the left arm back of the patient's waist, while the right



a *b*

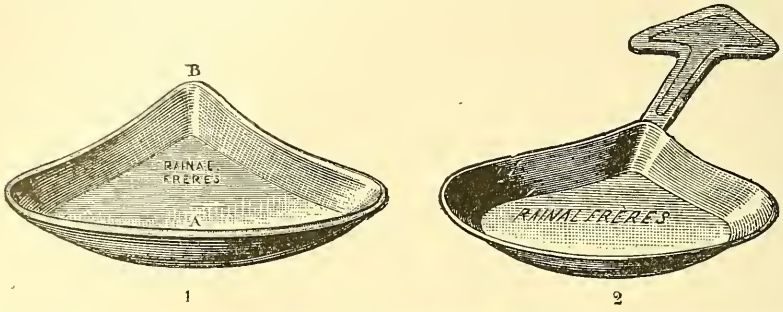
FIG 58 (*a* and *b*).—KELLY'S OVARIOTOMY AND PERINEAL PADS.

knee, semi-flexed, supports the elbow of the same side while the examination is progressing.

Dorsal Position.—For an examination of the abdomen or the simple vaginal touch we may have the patient lie on her back, with her head on a cushion, the legs a little flexed and the thighs abducted. In this position she may be examined provisionally in bed; but it does not produce sufficient relaxation of the abdominal muscles to allow satisfactory palpation, nor does it permit the use of the speculum.

Modified Dorsal Position.—(Semi-recumbent position.) This position combines the advantages of relaxation of the abdominal muscles and easy examination of the vagina by the finger or the spec-

ulum, and is to be preferred where we wish a complete exploration. The patient is placed at the edge of a bed or table; the upper part of the body is a little raised, as if the woman were half sitting;



1 2

FIG. 59.—1. Triangular basin for Dressings; 2. Basin with handle; to be placed under patient in dorso-sacral position.

the legs are flexed upon the thighs, and they in turn upon the abdomen, and are held in this position by the assistants or with the aid of foot-rests.

Dorso-sacral Position.—This is the most satisfactory position for all operations on the external genitals, the vagina or the uterus per *vias naturales*, since it renders all these parts most accessible to the surgeon. The patient is placed at the edge of the bed or the table; the head is elevated by a pillow, the trunk is horizontal, the pelvis is flexed upon the vertebral column so that the sacrum presents a marked obliquity both vertically and from behind forward. The knees are bent and the thighs strongly flexed over the abdomen and maintained in this position by the supports, or, better, by the assistants, each taking the flexed knee on his side under his axilla, thus leaving the hands free to assist the operator. If one has no assistants, the ingenious leg-rests of Fritsch may be employed. in combination with his speculum holder. Many forms of leg-rest have been invented; the type of such being Clover's crutch,

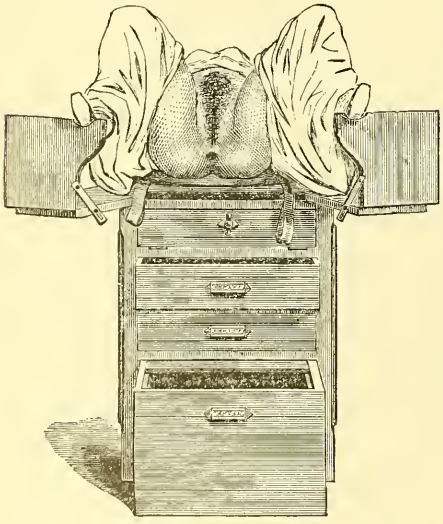


FIG. 60.—PATIENT IN MODIFIED DORSAL POSITION ON CHADWICK'S TABLE.

which has been ingeniously modified by Ott of St. Petersburg.[2] A very useful modification of this position is obtained by a decided elevation of the pelvis above the rest of the body; a position which might be called the inclined dorso-sacral. This tipping of the pelvis has the effect of allowing the abdominal contents to fall toward the concavity of the diaphragm and renders examination of the true pelvis very easy. For a simple examination this position is easily obtained by letting the patient lie on a couch, the legs flexed over the head-board, which serves as their support. If one has assistants at his disposal, he may let them turn their backs and take each a leg of the patient over their shoulders. This position is at times of great as-

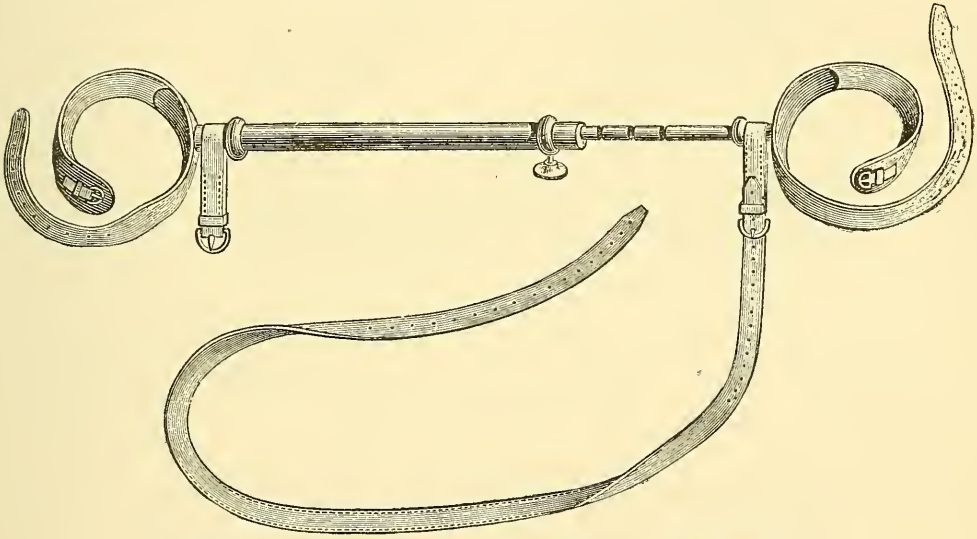


FIG. 61.—OTT'S LEG-HOLDER (the long strap is fastened to the table).

sistance to the operator, in freeing the pelvis of its contents; as, for instance, in examining for small tumors of the uterine adnexa. It has been recommended by Trendelenburg[3] in searching for tumors of the bladder, and by Pawlik in catheterizing the ureters; and has lately been re-introduced by Mendes de Leon.[4] To render exploration easy and the organs of the pelvis accessible during laparatomy, it has been found equally advantageous to allow an assistant to elevate the uterus by two fingers in the vagina, or to introduce into that canal an air-pessary—a procedure analogous to Petersen's use of a balloon during lithotomy.

[This posture—the Trendelenburg position with the pelvis elevated, the body resting upon an inclined plane at various angles up to

45° from the horizontal—is now employed by many as a routine measure during the performance of laparatomy; it seems to possess no disadvantages, does not interfere with the breathing, renders

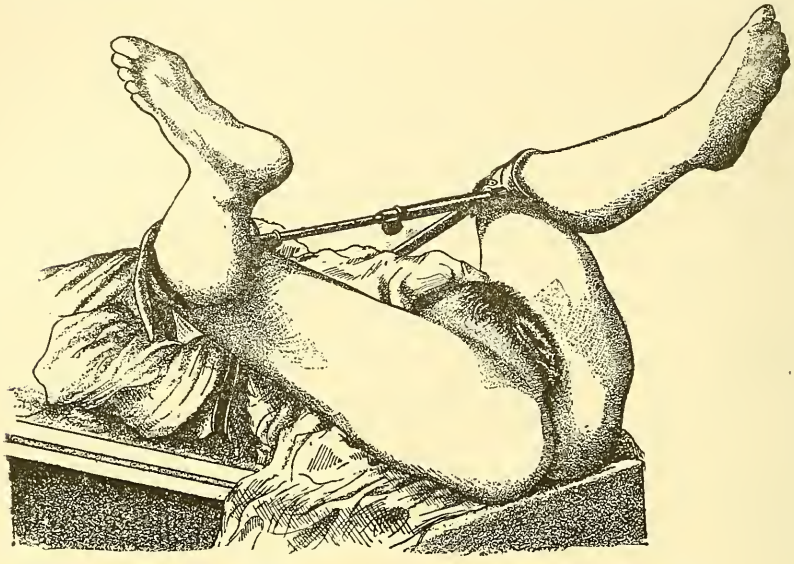


Fig. 62.—Patient in Lithotomy Position with Ott's Leg-Holder.

shock from acute anæmia less liable, besides causing the intestines to gravitate toward the diaphragm and rendering all parts of the

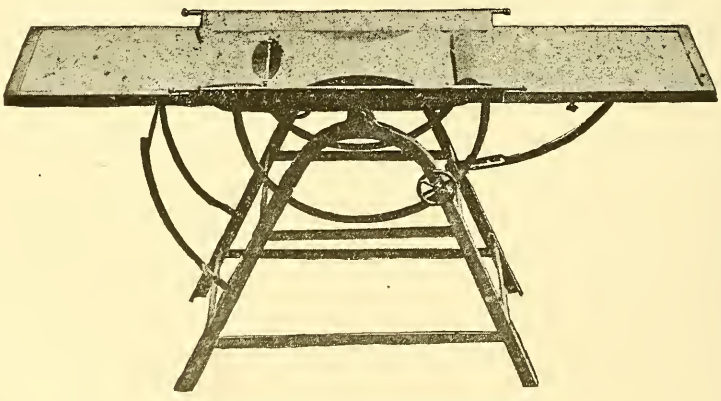


Fig. 63.—Cleveland's Laparatomy Table.

pelvis readily accessible both to touch and in many instances to sight, thus lessening markedly the technical difficulties of intra-pelvic surgery.]

Latero-abdominal or Semi-prone Positions.—This, the Sims position, is particularly adapted to examinations and treatment with the duck-bill speculum, the weight of the abdominal viscera, drawing forward and upward, neutralizes the intra-abdominal pressure and causes an easy and perfect separation of the vaginal walls. While of great use in many different circumstances, it is particularly desirable with very modest patients.

The woman, with all bands about the waist loosened, should lie upon her left side, at the edge of the bed or the table, flexing the legs

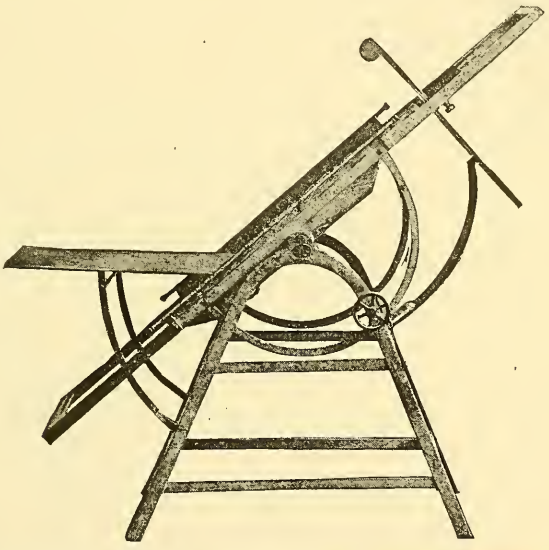


Fig. 64.—Cleveland's Laparatomy Table Arranged for Trendelenburg's Position.

at right angles with the thighs and these at the same angle with the body. The lower extremities may be held by an assistant, or by a support fastened to the table (Fig. 67).

The patient's body, instead of resting wholly on its side, is so turned that her chest is directed obliquely toward the table, and this is best accomplished by drawing the under arm out behind and allowing it to hang over the edge of the table. ["In this position the woman lies partly on her side and partly on her chest and abdomen, the abdominal viscera gravitate forward and downward away from the pelvic cavity; the pelvis has a lateral and downward inclination, so that a line drawn from the coccyx through the rima vulvæ will strike the left popliteal space. The posterior vaginal wall is thus

superior to the anterior and the uterus sinks downward and forward. For ocular examination this position is unrivalled and for many instrumental and operative procedures on the vagina and cervix almost indispensable. While a hard table, covered with a blanket or lightly upholstered, is undoubtedly the best couch for this position, and the examination is facilitated by giving the table a lateral and downward inclination toward the lower side and head of the patient, a tolerably satisfactory examination may be made on a firm, level sofa or bed, which does not allow the hip to sink into the level of the vulva. The table should be so placed that the light falls directly upon the vulva over the right shoulder of the operator; the table will, therefore, occupy a diagonal position before the window." [5]

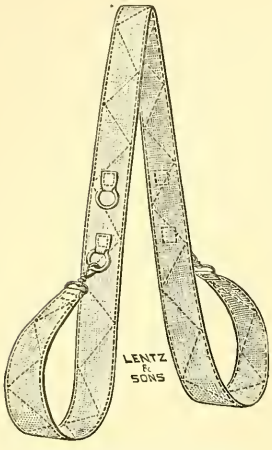


FIG. 65.—ROBB'S LEG-HOLDER.

3. *Genu-Pectoral or Knee-chest Position.*—In this position the body rests on the upper chest and knees, the pelvis being the highest

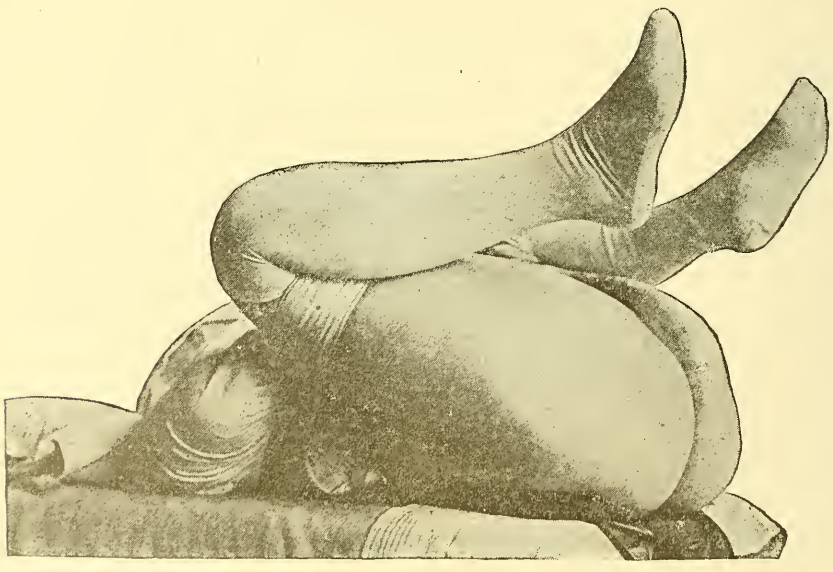


FIG. 66.—PATIENT IN DORSO-SACRAL POSITION; SHOWING APPLICATION OF ROBB'S LEG-HOLDER.

point. The thighs are at right angles to the pelvis, the knees near the edge of the table or bed, with the feet projecting over its edge;

the head is turned and rests upon the side of the face. [All clothing must be loose about the waist. In this position the weight of the abdominal viscera draws strongly upward and forward (in relation to the patient), tending to displace the contents of the pelvis in the same direction, and as soon as air is allowed to enter the vagina, to distend it to the maximum. For these reasons it is extremely valuable in the reposition of certain retro-displacements, particularly of the gravid uterus, or in freeing small incarcerated tumors.] Patients do not readily assume this position, claiming that it is immodest, but in certain cases, because of the reversal of intra-abdominal pressure and the vaginal distention, it is indispensable. The position is irksome, can-

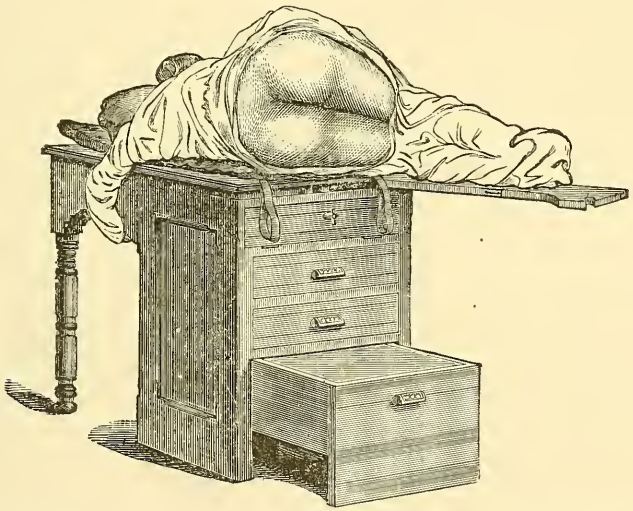


FIG. 67.—PATIENT IN LATERO-ABDOMINAL (SIMS') POSITION ON CHADWICK'S TABLE.

not be long maintained, and is not free from danger if used during anæsthesia.

4. *Genu-cubital or Knee-elbow Position.*—This, vulgarly known as the "cow" position, is little used except in Bozeman's operation for vesico-vaginal fistula.[6] The patient rests on the elbow and knees and is supported by special apparatus (see figure under Vesico-vaginal Fistula). Anæsthesia in this position is somewhat dangerous because of the interference with respiration.

Simple Abdominal Palpation.—The patient is placed in the dorsal position with the knees a little bent, and advised to open the mouth, breathe without effort, and avoid rigidity. The bladder and rectum should be empty, and it is well to completely clear the large

intestine beforehand by a cathartic and an enema. Both hands are used at the same time. They should be warm, for when cold they excite reflex contractions. Beginning very gently, the abdomen can be accustomed to the manipulation and then the tips of the fingers may be pressed in with more force for the purpose of deeper exploration. A certain amount of massage disarms the abdominal muscles, prevents reflex contractions, and permits the examiner to make a satisfactory palpation.[7] It is advisable to proceed methodically, examining the hypogastric region and then the iliac fossæ, determining the amount of alteration in the internal organs from their normal size or position; then proceeding to the umbilical and lumbar regions, and finally to epigastric and hypochondriac. The normal tension and

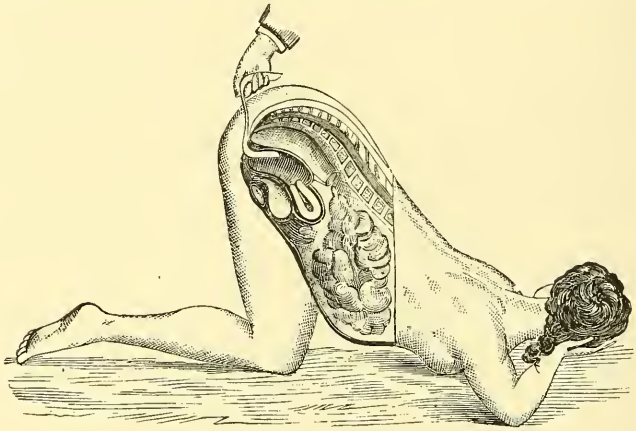


Fig. 68.—Genu-pectoral Position, showing the Dilatation of the Vagina and the Falling of the Viscera toward the Diaphragm.

consistence of the abdominal walls presents marked extremes. The age of the patient, previous pregnancies or multiparity, leanness or obesity, the distention to a greater or less extent of the stomach and the intestine from gas in dyspeptics, etc., are all conditions which present great diversities and may be the sources of error. I cannot pass them all in review, but will mention certain ones.

If the bladder and intestines have not been emptied, one is not safe against the illusion that there is a tumor, really due to their contents; and at all times too great confidence must be avoided. The soft consistence of fæcal matter gathered in the cæcum or the sigmoid flexure, its presence in the lumbar regions, and the possibility of making a dent in it which shall persist, as in clay, are all characteristic qualities which will disinguish it from other things. But even a

vigorous cathartic may fail to remove scybalous masses which may have accumulated, especially if there is any mechanical cause for constipation.

An enormously-distended bladder, reaching to the umbilicus, has frequently been mistaken for a cyst. This distention may be due to long retention and incomplete urination, so that the bladder gradually assumes an unusual size; or to pressure upon the vesical neck; or to nervous affections which lessen sensibility. I was once summoned to an asylum for the insane to puncture an ovarian cyst, which proved to be nothing but extreme vesical distention in a patient with general paralysis. Therefore always pass a catheter before making such examinations.

Finally, catheterism if rapidly done may not empty the bladder wholly. There are cases where the organ is bilobed,[8] wallet-shaped, from compression between a pelvic tumor and the pubis, and the communication between the two portions may be so restricted that the stream of urine ceases when the lower compartment is emptied. If this condition be suspected, a long catheter, which should be of stiffened rubber, will easily relieve the difficulty and empty the upper portion. It thus seems, occasionally, as if there were a pseudo-cyst overhanging a veritable tumor, with some obscure connection between them. The recti muscles of the abdomen often simulate tumors by rigid contractions of their mass and the sharpness of their borders. Especially is this true when there is a separation in the linea alba with lateral displacement of the muscles. It seems also that there may be partial contractions between two tendinous intersections, which increases the difficulty of diagnosis.

Meteorism may be so developed that it resembles either a tumor or pregnancy. In this case percussion gives us great assistance but does not remove all doubt; there have been cases of hysterical meteorism which have deceived the most distinguished observers.[9]

Extreme obesity, especially of the flanks, may render the examination very uncertain. I have often observed a local excess of adipose deposit in the hypogastric region on women who had some chronic disease of the genital organs, as one often sees a like formation over the epigastrium of dyspeptics.

Women who are hyperæsthetic, or cowardly, and consequently become rigid upon even the slightest touch, require to be put under an anæsthetic if it is at all necessary to reach a decision by examination. It is possible to obtain an insight into the patient's condition by bi-

manual palpation which far exceeds all others in precision, and in few cases (except where there is unusual flaccidity or leanness) can the ovaries and tubes be reached by abdominal palpation without anæsthesia. The various connections of a tumor cannot be exactly determined without such aid. Often, for instance, a tumor which appears to be connected with the uterus while the patient is awake, becomes easily separable under anæsthesia;[10] or a tumor which appears hard is found to be plainly fluctuant.

[*Inspection.*—Before making a vaginal examination in a strange patient, it is well to inspect the external genitals to detect the pressure of any anomaly, of pediculi, of specific or other ulcerations or eruptions, etc.]

Vaginal Touch.—The clean index finger is first covered with some antiseptic lubricant as borated vaselin, or carbolized oil and is then passed into the vagina with a motion from behind forward, gliding over the fourchette. [I have found a mixture of eucalyptol (℥ i.) and vaselin (℥ iv.) very pleasant and efficient, but prefer as a general lubricant a carefully-prepared, pure, neutral green soap, made for me by David Hays & Sons. This before use is diluted with sterilized water to the consistence of a thin jelly.] Many gynæcologists advise the use of antiseptic injections after such examination; in my opinion they are not less demanded beforehand. The finger may gather and carry with it germs from the vagina and then go on to make an erosion upon the cervix and so inoculate the patient. As a general rule, then, vaginal touch should be practised only between two antiseptic injections. To show the need of these precautions it is well to remember the accidents which used to follow simple vaginal touch in the days before antisepsis. Vernueil,[11] for example, reports a case of death from extremely acute peritonitis, the day after the examination by touch and speculum, of a woman with uterine polyp; he cites another of peritonitis which recovered in a woman with polyp; and a third, of ulcerated polyp, where death occurred after vaginal touch, the operation being postponed but one day. Howel cites a similar case in his practice, and one in Broca's, where death followed light cauterization with nitrate of silver. More recently, in Professor Le Fort's service, a woman with uterine polyp died after a vaginal examination by finger and speculum.[12]

The index finger is the most convenient for vaginal touch; the thumb should be kept straight, turned obliquely toward one or the other genito-crural fold, and always avoiding the median line; the

other fingers are half-flexed and make gentle pressure against the perineum and inter-gluteal space. To reach the os the finger should follow the lateral or posterior wall, and should it not be passed in the axis of the canal slight movements of rotation, from behind forward and reversed, will show its position. The examiner then considers, in regular order, the direction of the cervix, its size, its shape, its consistence, the degree of its dilatation and the condition of the external os. Next the finger explores the posterior cul-de-sac, then the lateral, and lastly the anterior. The examination is not complete, however, without the aid of abdominal palpation; that is to say, bimanual exploration, which will be treated farther on. On withdrawing the finger, the vaginal walls and perineum are examined as to their condition. There are times when the uterus is very high up and difficult to reach; in such a case both index and middle finger must be deeply introduced, at the same time the pressure against the perineum is increased, if necessary, by allowing an assistant to raise the elbow of the examining hand. Occasionally cases are met where the cervix cannot be reached in any position except Sims' or the knee-chest. At times it may be necessary to practise the vaginal touch with the woman erect, as in certain displacements and abdominal tumors. The hymen, if present, may be an obstacle to the introduction of the index, but usually this membrane is elastic enough to allow the touch, with some care, even upon virgins, without fear of injuring it. If this manœuvre is very painful, it is better to anæsthetize the young woman unless the desired insensibility can be obtained with cocaine. In such cases rectal touch does not take the place of vaginal, although some authors have asserted it.

Rectal Touch.—It is necessary to introduce the finger into the rectum, especially to examine the pouch of Douglas and the posterior aspect of the uterus. Swellings and tumors of this neighborhood are not to be appreciated at their just value by any other way. It is often very useful in determining whether the rectum is full or empty; the lumps of fæces felt by the finger in the vagina might, perhaps, be mistaken for pathological products. On the other hand, a novice may feel the cervix from the rectum and make a similar error. One must especially accustom himself to the sensations acquired by touch in the normal condition. The combination of rectal with vaginal touch is particularly valuable in examining the condition of the recto-vaginal septum.[13] Schroeder strongly advises, in practising rectal touch, that the thumb be passed into the vagina.

Manual exploration of the rectum, introduced by Simon,[14] of Heidelberg, is to be employed in certain exceptional cases. The patient is thoroughly anæsthetized, the anus is dilated as for operation in fissure of the part, and the fingers, gathered into a cone and well coated with vaselin, are gradually pushed into the orifice as a wedge; when the sphincter has been passed the hand rests easily within the rectal ampulla and the fingers may be separated for the examination. I have found this procedure of service on two occasions and each time have introduced my hand to the wrist without any resulting accident, erosion, or incontinence. Nevertheless I consider it dangerous, especially if the surgeon's hand is not unusually slender and pliable; there have been serious accidents in certain cases.[15]

Vesical Touch.—This method has only a restricted application, but in view of the size and dilatability of the female urethra, it is generally easy to carry out without recourse to incision as proposed by Simon. I have found no difficulty in its performance without producing any disagreeable consequences after previous dilatation of the urethra by Hegar's bougies [or carefully by the ordinary Palmer uterine dilator]. This method has been recommended in cases of cancer of the cervix with doubtful invasion of the vesical wall to determine the mobility of the mucous membrane upon the cervix and the presence or absence of the complication.[16]

Noeggerath's combination of vesical and rectal touch renders excellent service in atresia of the vagina and in practising palpation and bidigital exploration of the uterus and appendages.[17]

Among combinations of methods we may further mention vesical catheterism with vaginal or rectal touch, for, as Professor Guyon well says, "The catheter is only an elongated finger."

Bimanual Exploration.—I have described the vaginal and the rectal touch singly for convenience' sake, but in practice one seldom examines without adding abdominal palpation also, which supplements them admirably. Thus arises the most valuable method of gynæcological investigation, bimanual exploration. Practised in a skilful manner by Puzos, Foubert, Levret and Baudelocque, this manœuvre was never wholly given up in France, but elsewhere it was much neglected until the reintroduction of the speculum. It is owing to the labors of Schultze[18] that it finally regained its deserved eminent rank.

The glory of the discovery of bimanual palpation belongs wholly to Puzos, the celebrated obstetrician of the eighteenth century, and to the

French school. In his "Traité des Accouch." (Paris, 1739, pp. 56–64), in regard to the insufficiency of the vaginal touch, practised by himself until then, he says: "There is another method of examination which furnishes, in a doubtful condition of a woman, information as trustworthy as that obtained by the old way was uncertain and false." Then follows a description of the method of applying one hand to the abdomen and introducing into the vagina one or more fingers of the other hand. He then insists on precautions necessary for greater success in the operation, such as doing it in the morning, fasting, preceding it with one or two enemata to clear the large intestine, etc. He says, furthermore: "If by the touch, as I propose it, one can understand the normal state of the uterus, it is far easier to judge of the maladies to which it is so subject in circumstances where one suspects disease." Soon after Puzos discovered this method as applicable to women, Foubert (1736) practised it upon men, creating a combination of rectal touch and abdominal palpation. He says: "I found a means at length which is simple and easily informs me of the degree of fulness of the bladder; with the finger which I have introduced into the rectum and the hand which I have applied to the abdomen, I make many alternating movements, which determine exactly how full the organ is through the rectal membranes ("Mem. d. Acad. Roy. d. Chirurg.," t. I., p. 301, 1743). After Puzos the method became general in France, and Levret, especially, mentions it often in his works on obstetrics and diseases of women. Baudelocque says: "Touch means not only the finger in the vagina, but also the hand upon the abdomen," and advises: "relax the abdominal muscles, evacuate the urine and fæces, etc., displace the small intestine right and left with the hand on the abdomen, pressing toward the uterus ("L'Art d. Accouch.," t. I., p. 125, 1781). He also states (*ibid.*, p. 325) that in extra-uterine pregnancy it is by this means that the position of the child can be discovered, whether in the tube or the abdominal cavity. The method is further described in his "Art des Accouchements," arranged in question-and-answer form, which was translated into German ("Anfang d. Geburt.," Colmar, 1807, p. 84). In France this exploratory method has never been abandoned, but has been in skilful and constant use. Th. Giraud, in a thesis on acute ovarian phlegmasia, says: "Touch by abdomen and vagina is a precious possession, which should be insisted upon as the regulator, the mariner's compass, of diagnosis" (Paris, 1831, No. 169, p. 13).

Velpeau, after describing the combined method, says that nothing

can escape the two hands as they meet. "It is seldom that a simple engorgement of ovaries or tubes, of the uterine adnexa in general or of the lymph ganglia, or the presence of a small vesical calculus, is overlooked" ("Trait. Compl. d. l'Art d. Accouch.," 1835, 2d edit., t. I., p. 192). Much later ("Discuss. Acad., Malad. d. l'Uter.," 1854, p. 83) he says: "One can thus lay hold of the uterus between the two hands, estimate its density, direction, shape, all its physical characteristics, in one word, obtain the same clearness of idea as if it were upon the table and simply wrapped in cloth." He mentions also that the number of women

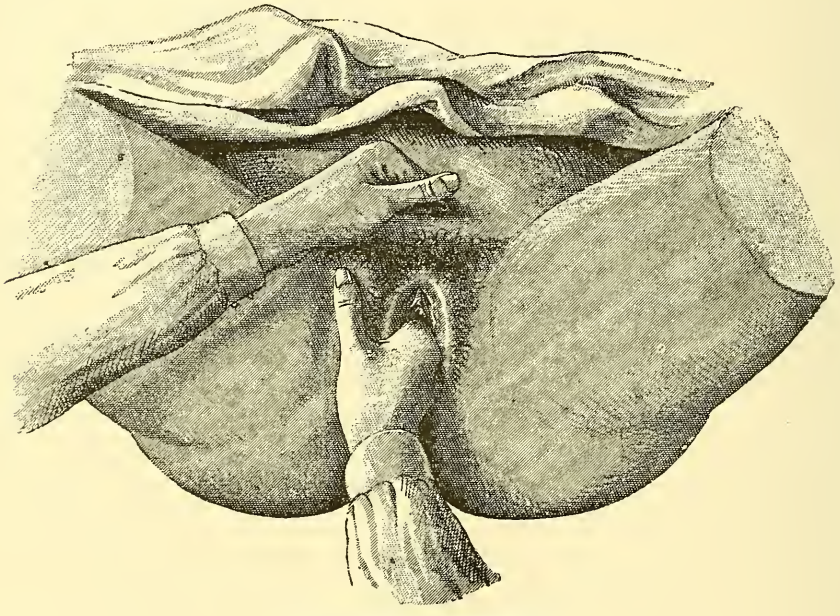


Fig. 69.—Bimanual Exploration.

whom you cannot thus examine is very small: "I have collected statistics upon this point," he declares, "lasting over considerable time, and out of four hundred I have not found more than one hundred refractory, and these not absolutely so." And that no one may suppose the method but recently invented—"I have proved its exactness every day at the hospital for twenty-five years, demonstrating it at the bedside to any one who desired it."

It thus becomes plain that Hegar is wrong in claiming the honor of its discovery for von Schultze, Holst, and Veit. The subject has been well treated by L. Guernes ("De l'Hémato-salping.," Thèse de Paris, 1888, No. 178).

For the employment of the method the patient is placed in simple dorsal decubitus, or, if that position offers any difficulty, as for lithotomy; while the index of the right hand practises the touch, as described, the left hand is laid above the pubis, and the fingers sunk inward with gentle, even pressure, thus driving the pelvic contents toward the vaginal finger. To make clear the exact position of the uterus, this procedure is carried out in the hypogastric region, then in the inguinal, and lastly the lumbar should be examined, the vaginal finger exploring the depths of the culs-de-sac toward the other hand;

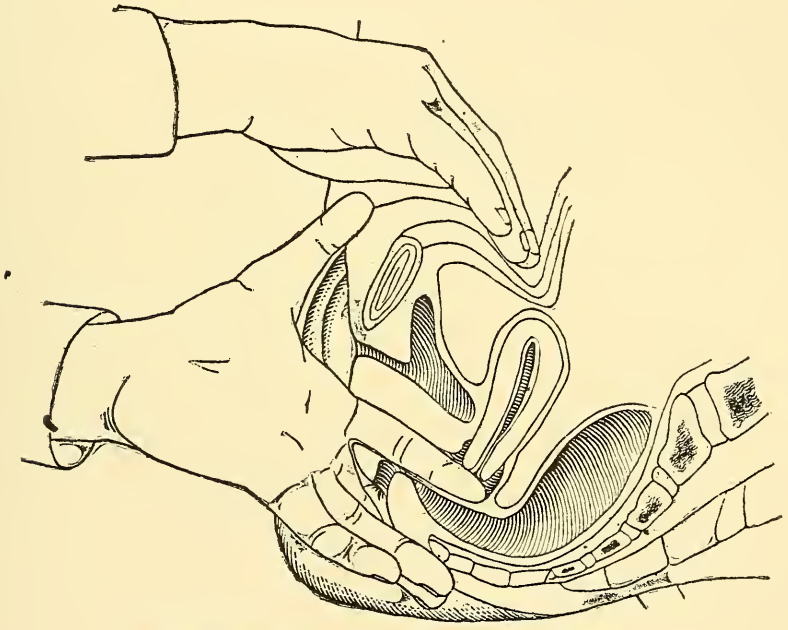


FIG. 70.—BIMANUAL EXPLORATION. Sectional view (Davenport).

thus the bases of the broad ligaments and the uterine adnexa are easily examined for abnormal enlargements. At the same time account should be taken of the sensitiveness of the parts; in the healthy condition, pressure over the adnexa, as also elevation and tossing (balottement) of the uterus, are free from pain.

Bimanual palpation should then be made by rectum and abdomen (Holst); it is particularly advisable in disease of the adnexa.

By the combined method one can palpate the ovaries, with special facility if the patient is anæsthetized, but even without such aid. It is well, as Hegar advises, to have the uterus gently pulled down by an assistant, the cervix being fixed with a (tenaculum) forceps

while the surgeon palpates the abdomen and passes the index of the other hand by turns into vagina or rectum; the ovary is felt to glide between the fingers like a small testicle. The left ovary is more easily reached than the right, which Olshausen attributes to its position in front of the rectum. With obese patients this method of examination has many difficulties. Instead of adopting Noeggerath's vesico-rectal method, I think it better to have recourse to the plan advised by Ulmann [19] (a pupil of Albert, Vienna) in difficult cases where ovarian palpation seems indispensable; the bladder being emptied, there is

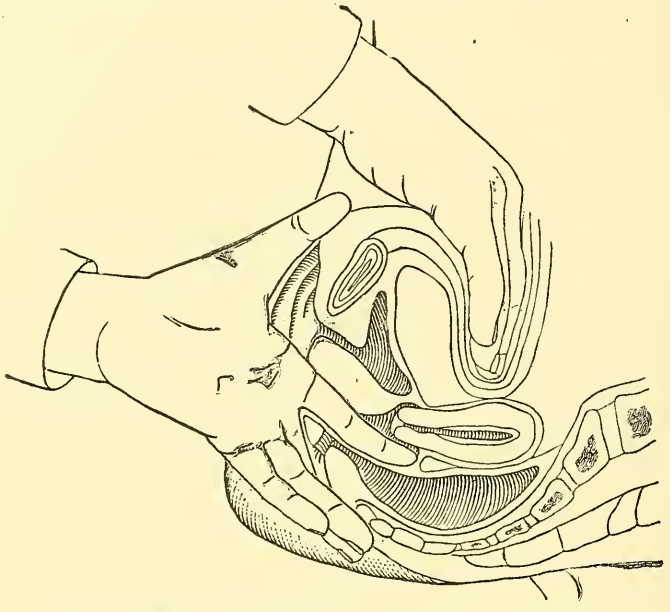


FIG. 71.—BIMANUAL EXPLORATION IN RETROVERSION (DAVENPORT).

passed into the rectum a balloon filled with 200–250 gm. of water. Now bimanual palpation reveals the uterus and its appendages strongly elevated and held in that position upon a resistant body, which makes them very accessible.

Examination by Speculum.—After Recamier had reinvented the speculum, this valuable instrument led to the neglect of all other exploring methods; from this point of view, one may assert that the great service it has rendered to gynæcology has been equalled by the temporary evil it has caused.

The form of the instrument has undergone endless changes; but of these, however ingenious, only a small number are absolutely necessary.

There are three chief types, the cylindrical, the bivalve or the trivalve, and the univalve.

The Cylindrical Speculum.—This form is particularly suited to topical applications; made of wood or ivory it protects the vaginal walls from heat during the use of the actual cautery; made of silvered glass and covered with hard-rubber [or better of white celluloid] it cannot be used for that purpose, but is valuable on account of the clear view it gives and the ease with which it can be introduced, both for superficial examinations and for the different dressings and applications which are required for the cervix. These specula should not be too long and the end should be bevelled to

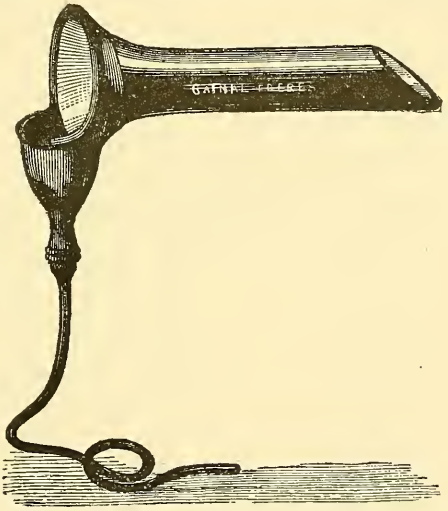


Fig. 72.—Ferguson's Cylindrical Speculum, to which is fitted a rubber funnel for dressings and fluids.

correspond to the greater depth of the posterior vaginal cul-de-sac. It is necessary to have at least three different sizes.

Before introducing the speculum it is well to dip it in warm water so that its polished surfaces may not be dimmed by the vaginal moisture. It is then coated with vaselin and presented obliquely to the vaginal orifice, whose lips are separated by the fingers of the other hand. The point of its bevelled end is then pressed backward against the perineum, and glides over the groove of the fourchette, avoiding friction against the urethra and anterior vaginal wall as much as possible. When the vaginal orifice has been passed, the instrument is tilted so that its axis corresponds with the direction of the cervix, previously ascertained by the finger, is pushed up gently, aided by

the sight, to embrace the external os, guarding against the tendency to search for that structure too far behind and too deeply. [In certain cases where the vagina is very voluminous, or the cervix in an unusual position, it may be difficult to engage the cervix in the lumen of the speculum. In these instances the sound may be first introduced and the speculum passed over it as a guide, or a tenaculum may be used for the same purpose.]

Multivalve Specula.—It is needless to describe the three-valved instrument of Segalas, or the four-valved model of Charrière, in spite of their interesting history; those of more recent invention appear to me but little better. [The Nott speculum is the best of this class.]

Bivalved specula are the most useful to the general practitioner.

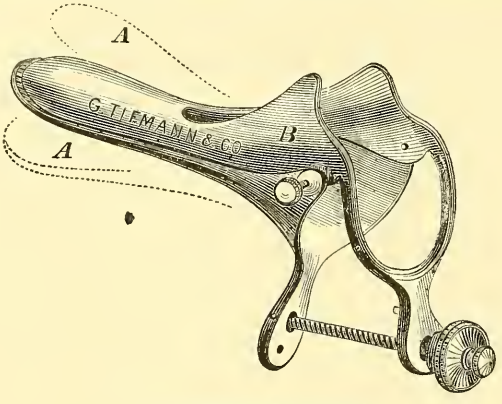


FIG. 73.—BREWER'S SPECULUM.

Cusco's or Brewer's speculum, the so-called "duck-bill," is an elegant and simple instrument, especially adapted to use in examinations; it has the advantage of allowing inspection of, first, the os, then, by gradual withdrawal, of the culs-de-sac and vaginal walls. Its small size and readiness of introduction make it valuable, and it may be kept aseptic by placing it a few minutes in boiling water or strong carbolic-acid solution. The introduction of this instrument is accomplished according to the rules laid down for the use of the cylindrical. I would merely remind students that the axis of the vulva is perpendicular to that of the vagina, and that while the end of the speculum should be turned obliquely, at an angle of 45° to open the vulvar orifice, it should be restored to the horizontal position as soon as it has passed in. The blades must not be separated until the instrument is wholly within the vagina, in order that the vulva may not be unduly distended. In all of the bivalve specula, it is necessary

to have a groove or slit in the upper blade to avoid pressure upon the sensitive parts about the urethra and to render the introduction of instruments (sound) less difficult.

One must not forget that the introitus is the narrowest part of the genital canal, and that just within it the vagina forms a kind of pouch comparable to the rectal ampulla; the diverging of the blades in the bivalve speculum is therefore seen to be essential.

Univalve Specula.—These instruments are chiefly intended for

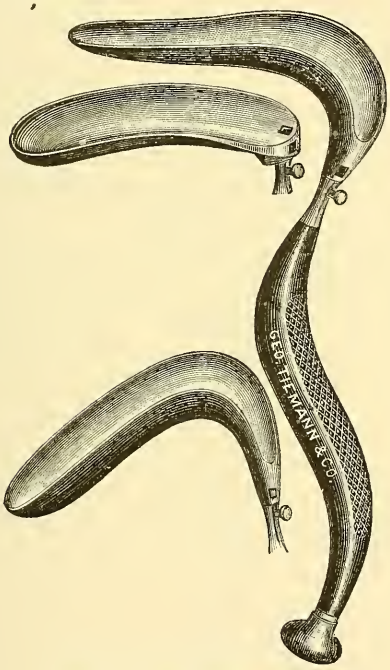


FIG. 74.—SIMON'S SPECULUM.

FIG. 75.—VAGINAL RETRACTOR.

use in operation. With only one it is easy to reach the vaginal wall opposite the instrument, and so with the patient in the Sims or genu-pectoral position, one can easily reach the cervix. With two single blades, employed at the same time, we have the best possible method of examining vagina and cervix, but it has the inconvenience of requiring assistance. Long before Sims made the use of the univalve speculum common, such instruments had been employed by certain skilled practitioners. Récamier, Piorry, Jobert de Lamballe, in France, made use of half-cylinders, sometimes of small metal splints mounted on handles.

The latter surgeon owed his success with vesico-vaginal fistula as

much to his superior instruments as to the brilliance of his conceptions.

Sims' speculum is to be employed in the semi-prone position which bears his name. In his instrument two blades are joined end to end to lessen the number of single instruments. In the semi-prone position this arrangement presents no difficulty, but it is almost impossible to use the instrument in the lithotomy position, ordinarily adopted in France. The blades are of metal and their surface is bright to reflect the light. For my own part, I prefer Simon's hollow blades. They are mounted on a handle and have a strongly-marked sweep. They come in sets and are made concave for depression of the posterior vaginal wall (this shape augments the amount of light), and

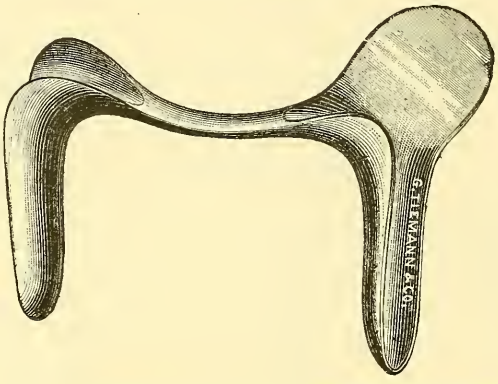


Fig. 76.—Sims' Speculum. One blade is shown with the flange devised by Mundé for supporting the upper buttock.

flat for the anterior wall. Moreover, in the course of an operation one can employ one or more retractors, which are narrow blades mounted on handles long enough to keep them out of the surgeon's way.

One variety of Simon's blades is very short, reduced almost to its anterior portion and widened at that place to increase the amount of reflecting surface; this is particularly useful for operations on the cervix, where it is to be drawn down to the entrance of the vagina.

[While the comfortable and efficient use of the Sims speculum usually necessitates the presence and aid of a nurse, there is no other means by which the cervix and anterior vaginal wall can be so perfectly exposed without interfering with the natural relations or mobility of the parts. In manipulations requiring the use of one hand only, such as applications or tamponade, the operator can, if necessary, hold the instrument with his left hand, the flanged mod-

ification of Mundé being employed so as to support the upper buttock.

There are many modified forms of the Sims speculum, varying in curve or breadth, but none are better than those here shown which can be procured in several different sizes. Many attempts have been

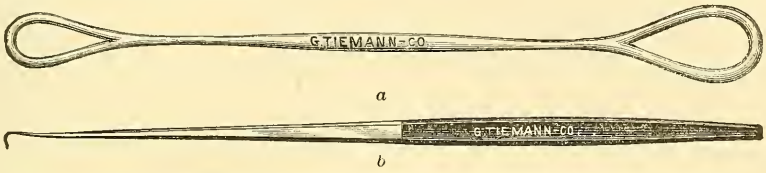


Fig. 77.—*a*, Sims' depressor for the anterior vaginal wall; *b*, tenaculum with stiff shank.

made to devise a perfect self-retaining speculum of this class, but none have proven entirely satisfactory. That devised by Cleveland is the best and is very efficient in most cases. It can also be used with the patient in the lithotomy position, being held in place by a piece of rubber tubing laid under the patient's hips, and retained by her weight. I have often done small operations in this way very satisfactorily and with no assistant but the anæsthetizer. There are

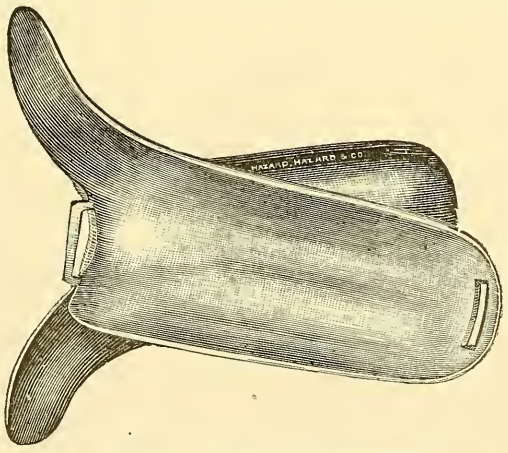


Fig. 78.—Cleveland's Self-retaining Speculum.

two instruments, the depressor and tenaculum, which are indispensable in using the Sims ; the first to press forward the anterior vaginal wall and to bring the cervix forward into the axis of the speculum, and the latter to steady it or draw it slightly downward or forward. To insert the speculum, the patient being in the Sims position already described, the warmed and lubricated instrument is taken firmly by the external blade in the left hand, and the point of the blade to be

used passed into the vaginal orifice with the concavity directed upward (or downward), the upper buttock and labium being lifted out of the way by the right hand or by the nurse. As soon as the point of the blade is fairly in the vagina, the concavity is turned forward and the point backward when it glides along the posterior vaginal wall until completely inserted, when on retracting the perineum backward and slightly upward the cervix will be exposed. A slight upward tilt to the outer end of the speculum allows a better light. The cervix being exposed, the speculum is handed to the nurse who, standing at the patient's sacrum, grasps the blade firmly with the full hand and continues the traction in the same direction, her arm resting against her side. This holding of the instrument is at first very irksome and

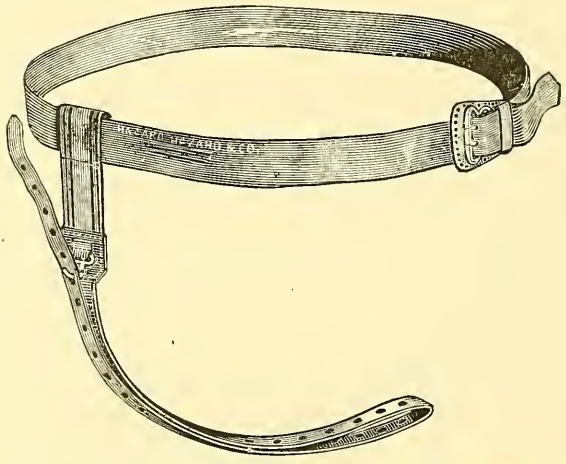


Fig. 79.—Belt for Use with Cleveland's Self-retaining Speculum.

difficult, but it is an accomplishment soon acquired after a little practice. The traction must be even and steady so as not to cause pain to the patient and must be made so as not to tip the point of the blade too far forward or backward. If the posterior wall is closely followed in inserting the blade and it is passed behind the cervix, the latter will come into view easily, and it is not necessary to pass in the blade on the finger as was formerly taught. There is sometimes difficulty in exposing the cervix where the vagina is long and voluminous, and in these instances it is very necessary to have the patient in good position and all clothing loose. Very rarely it may be necessary to put the patient in the knee chest position.]

Uterine Sounds.—Levret appears to have been the first who explored the uterine cavity by introducing an instrument, but it was

only after the writings of Huguier in France, Simpson in England, and Kiwisch in Germany, that its use became general. As it first became known it was much abused, and Scanzoni complained with reason against such excess. The forms of the hysterometer have been multiplied, without real advantage; the simplest is the best. It is a single graduated metallic stem, ending in a small button above, and below in a broad spatula-shaped handle, which facilitates the operation of holding and guiding it. The instrument should have some rigidity, and yet be flexible enough to take and preserve the different curvatures which it may be necessary to give it; silver and pure copper are the best materials for this purpose; the inflexible hysterometers of German silver should be rejected. The little slides which are made to be pushed along till flush with the cervix, and so mark the depth of the uterus, should also be proscribed; it is sufficient for this purpose to seize the sound with dressing forceps at the desired point [or to place the finger against the sound at the os as it is withdrawn] and read the degree marked on the scale. The sound should

FIG. 80.—UTERINE SOUND,

never be used without having previously ascertained the position, shape, and size of the uterus [and the absence of peri-uterine inflammations or the possibility of pregnancy] by means of bimanual palpation; otherwise one gropes in the dark and may produce serious injuries. It is enough to bend the tip of the instrument in the desired curve and to carry the handle in the opposite direction, to introduce it with ease, even in flexions of the uterus.

Flexible sounds have been invented, furnished or not with dials, which seem to me better than simple rubber bougies, when a rigid sound will not enter on account of the sinuous curves of the cavity.[20] [These are practically never required.] The best position for sounding is the dorso-sacral. It can be done without the aid of a speculum, by slipping the instrument along the palmar aspect of the index held at the orifice of the cervix. The pressure applied must be very gentle, and one must bear in mind that there is almost always a feeling of constriction at the upper part of the cervix. The finger applied to the stem, at the margin of the external os, shows how deeply it has penetrated. It is probably better to employ the specu-

lum that there may be no difficulty in the procedure and because of the aid to diagnosis; detraction and fixation of the cervix should be accomplished by a pair of hooked forceps. This is at times the only way of reaching the cervix if it is displaced into one or the other of the vaginal culs-de-sac, as in malpositions of the uterus. I have found gentle traction upon the cervix of value, from its effect of straightening the uterine canal.

[It must be remembered that the passage of the sound is to be accomplished with the utmost gentleness, the instrument being held delicately between the thumb and forefinger, and that skill must take the place of force. The conditions under which it may be employed have been mentioned and necessitate a practical knowledge of bimanual palpation. The physician will find that the more skilful he becomes in pelvic examination, the less often he will need the information given by the sound. I prefer to use the instrument with the patient in the dorsal position and without the speculum, as much more information as to the mobility and position can be obtained. The beginner usually finds difficulty in passing the internal os when the uterus is in a normal position or anteflexed. This obstruction is usually overcome by markedly depressing the handle of the sound when its tip reaches this point. In a few cases this manœuvre may fail and it may be necessary to put the patient on the side and pass it through the Sims speculum, steadying and straightening the cervix by means of a tenaculum.]

The most vigorous antisepsis is indispensable when passing the uterine sound, the instrument being disinfected as already described, and after each examination heated in the flame of an alcohol lamp. A vaginal injection and a thorough antiseptic cleansing of the cervix, by means of a stick wrapped with absorbent cotton, are necessary preliminaries. The researches of Winter[21] have demonstrated that in the majority of cases the cervix contains pathogenic germs, dormant and inactive, possessed of a very slight virulence as inoculation proves; but these germs have never been found by him within the cavity of the uterus unless the sound had previously been used. The sound, therefore, can without any doubt transport these germs to the upper portions of the genital tract, where normally they are not present, and this is the cause of the accidents—metritis, salpingitis, and perimetritis—which one may observe after the use of a proper sound which has passed through a cervical cavity not previously cleansed.

I would consequently recommend with emphasis that the young doctor should never use the uterine sound without being assured of two chief points: 1st. The fact that the uterus is empty, ascertained by careful questions and bimanual palpation; in the case of any doubt, indicated by delay in menstruation for several days, the procedure must be given up; for numerous abortions were produced during the time when the sound was used with too great frequency. 2d. The strict asepsis of the instrument. The notches marking its graduation are difficult to clean thoroughly, and it would be better to use instruments which are not so marked at the price of making measurements a little less conveniently.

The sound must be held in the flame, after having been washed with carbolic-acid solution, immediately before its introduction. I have known several cases of metritis and salpingitis after the use of the sound in the hands of well-known physicians, which are to be attributed to the lack of minute antiseptic precautions.

The uterine sound affords us an exact idea of the permeability of the cervical canal, of the two diameters of the uterus, longitudinal and transverse, and also of the organ's general direction. In the normal state the sound passes without difficulty, except for a slight resistance at the level of the isthmus, to the depth of five or six centimetres in nulliparæ, and six or seven (two and one-half inches) in those who have borne children.

The extent of lateral movement which it can make is very limited; it is, so to say, immobilized between the anterior and the posterior wall. If, however, the point of the instrument is freely movable and can be turned in different directions, it is because the antero-posterior and transverse diameters are increased and the cavity is of unusual size.

Is it possible to pass the sound into the Fallopian tubes? This is the explanation of some authors in those cases where the instrument penetrates deeply into the abdomen and can be detected through its wall. That this may occur there must be a combination of very unusual circumstances: a latero version of the uterus which brings the orifice of the tube into the long axis of the cervix and an exceptional wideness of its opening. This condition actually existed in a case observed by Bischoff,[22] and was verified after death following ovariotomy. But in almost every one of the published cases of pretended sounding of the tubes, it is far more likely that there was a perforation of the uterus—a condition which is easily produced without exaggerated efforts when the uterus is softened and thinned from

pregnancy or recent abortion, or when it is displaced; the benign character of such wounds has surprised most of those who have witnessed their production and has induced them to seek an explanation which appears more plausible. This is without doubt the significance which must be given to two cases recently reported by Gönner[23] of Basel. Finally we may note the possibility of establishing permanent false passages and the introduction of the sound by the same route into the abdominal cavity. But these are, in truth, but pathological curiosities, with which we have little to do.[24]

Fixation and Downward Traction of the Uterus.—This procedure should be classed among exploratory methods, not that it is employed by itself, but because it renders immense service, associated with other means, in facilitating examination.

Hegar[25] has shown that it is possible by this method to examine the entire posterior aspect of the uterus, and even to reach beyond the fundus by rectal touch, simply by seizing the cervix with a pair of forceps and gently drawing it downward. I have already indicated all the advantage procured by the passage of the sound with fixation of the cervix and without infra-traction. We will see also that direct exploration of the uterine cavity demands the same auxiliary.

Many practitioners dread to employ this method of drawing down the uterus. Before antiseptics many accidents were attributed to it which were due to infection. The profession was urged to contend against such fatal practices. But nothing is less dangerous than infra-traction of the uterus when antiseptic precautions are observed; even when the procedure is carried out with force, as in bringing the external os to the vulva in certain operations, there is no danger with strict antisepsis. For my part I daily practise the one or the other method in my service and have never met with an accident which could be attributed to it. It is only necessary to remember that there is danger as long as there is the least sign of acute or subacute perimetritis.

It seems advisable to me to establish a distinction between fixation and downward traction (abaissement). The first denotes merely holding the uterus steady with as little traction as possible upon its ligaments; the other actually pulls the organ downward, with a perceptible effort, below its normal level. Now, in examining it is rarely necessary to go beyond simple fixation, and if the organ is at all drawn downward, the degree of such traction is very moderate.

The method employed is very simple. The patient being placed

in the dorso-sacral position, the operator grasps the anterior lip of the cervix, guided to it by his index finger or through a speculum. A hooked forceps (which is merely an American bullet extractor) is the best instrument for the purpose (Fig. 81); it makes only two trifling punctures, which cause no discomfort and bleed but little. It is only when the force employed needs to be great, or the position maintained a long time, that Museux's forceps are required; we must then take care that they are constructed according to the model I have recommended, where the blades meet exactly without the over riding which is found in the form most commonly used. With this small matter correct, the wound made is very slight, and the surgeon need run no risk of injury to his finger as he passes it over the part seized.

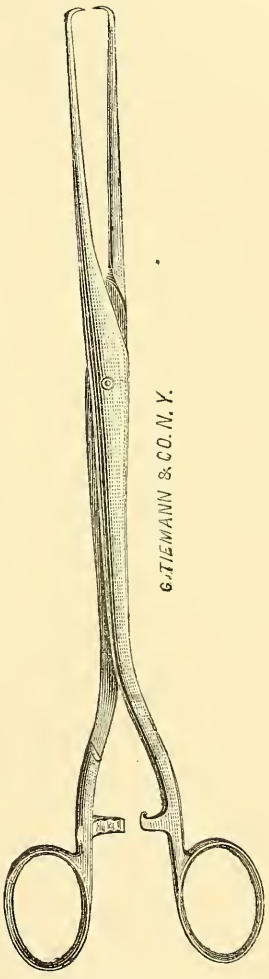


Fig. 81.—Fixation Forceps.

Artificial Dilatation of the Uterus, and Intra-uterine Touch.—There are certain rare cases where it is necessary to explore the uterine cavity with the finger, either to confirm a diagnosis or as a preliminary to operation. This bold plan originated with Simpson; to accomplish it several methods have been proposed. Before discussing them it is necessary to establish a distinction; the cervix presents a narrow canal, not a simple orifice, which has an upper, supra-vaginal, and a lower, or external mouth. The points requiring especial consideration are the condition of the internal os and of that part of the cervical canal which lies above the vagina. In certain cases the patency and greater or less degree of softening of the internal os present no obstacle to exploration, except below at the os externum; for instance, in certain intra-uterine fibromata and polypi, just after abortion, etc. Such cases are essentially different from those where the whole extent of the canal is rigid, and the same measures will not produce equivalent effects in the one class as in the other. Let us pass the principal procedures in review.

The principal methods of dilatation may be divided into two classes:

1. Bloodless methods, comprising: A. Gentle dilatation by tents; B. Divulsion; C. Immediate progressive dilatation.

2. Those accompanied with bleeding, consisting of two important operations of diverse character, viz.: A. Opening of the external os by incision; B. Entire bilateral division of the cervix.

No one of these procedures should be adopted in practice unless absolutely necessary, and every dilation of the uterus should be regarded as dangerous, particularly if there is the least reason to suspect recent inflammation about the uterus or its appendages.

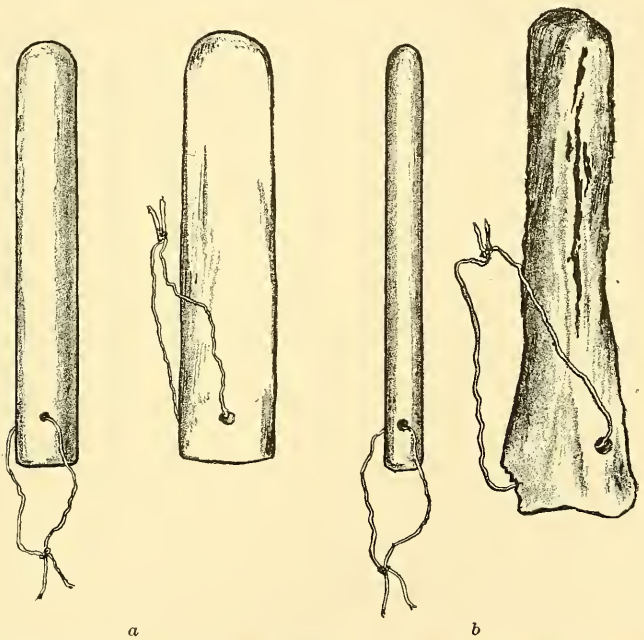
Bloodless Methods.—A. Gentle dilatation by means of absorbent expansive materials is accomplished by introducing into the cervical canal cylinders of different material, among which prepared sponge, laminaria, tupelo, slippery elm, decalcified ivory, and gentian root are advocated.[26] I will not stop to discuss the relative merits of these various tents; the matter seems to me decided in favor of laminaria, and although I do not wholly reject prepared sponge, rendered aseptic, I still believe that it has only a limited application. Laminaria, used in fagots, that is, several tents at once, if necessary, suffices for nearly all our needs. This excellent therapeutic agent was introduced to surgeons by Sloan.[27]

After thorough disinfection by laying them in iodoform-ether, tents are employed in the following manner: The vagina is carefully irrigated; the patient then being put in the dorso-sacral position, the cervix is exposed by the bivalve speculum or two of Simon's blades; it is then advisable to grasp the anterior lip of the cervix with a tenaculum forceps and thus hold it firm during the introduction of the tent; the position of the uterus must have been ascertained beforehand by the use of bimanual palpation and the sound. The tent should be slightly curved to adapt it to the natural curve of the canal which is to receive it; then, well covered with vaselin, it is grasped by a forceps and gently introduced. The end, to which a small thread is attached, must be left outside the cervix. Two or three tents may thus be inserted within the canal if the introduction of one of sufficient size is too difficult, for violence must never be employed. The fixation forceps being removed, a tampon of iodoform gauze is placed over the cervix and then the speculum is withdrawn.

About ten hours are required for the laminaria tent to become thoroughly dilated; then it is removed by gentle traction upon the thread passed through its lower end. Sometimes, however, there is some difficulty, as the tent may have assumed an hour-glass shape,

from constriction at the internal os. Then the extremity must be seized with a forceps, and withdrawn by combined traction and rotation, while the finger offers a point of support at the external os.

Despite all antiseptic precautions, we must not regard dilatation by tents as an inoffensive operation; for one sometimes encounters symptoms of acute metritis after their use, with severe pain and marked febrile movement. They should, therefore, be employed with more moderation than is usually advised.



a *b*

FIG. 82.—(*a*) TUPELO AND (*b*) LAMINARIA TENTS BEFORE AND AFTER DILATATION BY SOAKING FOR EIGHT HOURS.

[While no other tent dilates so rapidly or produces so great a degree of softening of the uterine tissues as one of compressed sponge, their use is entirely abandoned in America, because of the difficulty of rendering and keeping them sterile and the great danger from septic accidents following their employment. Their place is very satisfactorily taken by the compressed tupelo (made from the strongly compressed root-wood of the Nyssa uniflora, Wang.) which can be procured of any necessary dimensions, has little tendency to become septic, dilates (about 100%) rapidly (in from four to eight hours) and gently, causes only moderate pain, and does not irritate the uterus excessively. While, as I have said, these tents have little tendency

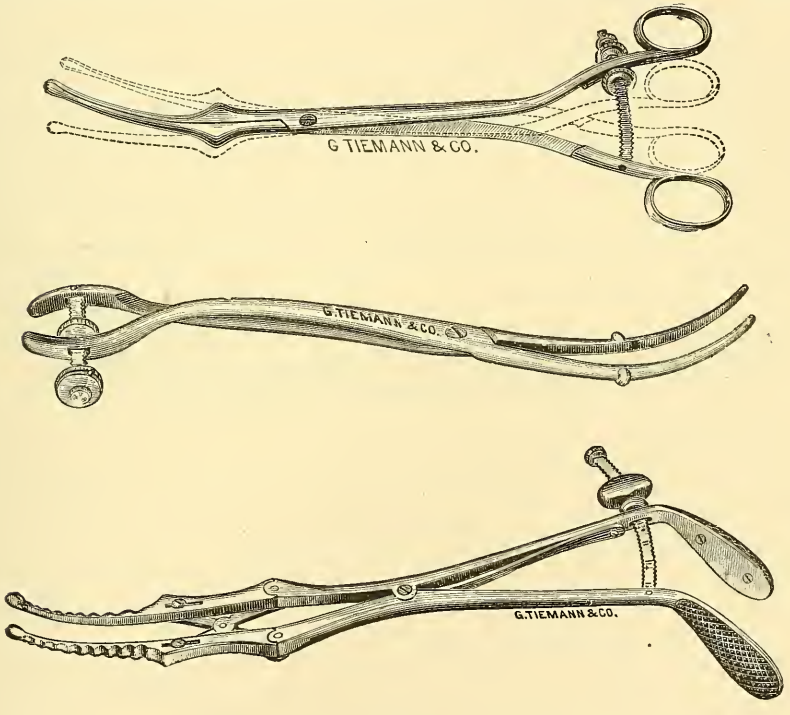
to become septic, we can, if necessary, easily render their sterility absolute by inclosing each one in a small sealed paper envelope and baking them at a temperature of 250° F. for three hours; the envelope being opened only at the moment when they are to be inserted. These tents are especially valuable where considerable dilatation is required, as in cases of incomplete abortion with contracted os or before the removal of submucous fibroids, etc.

Tents are ordinarily best introduced through the Sims speculum with the patient in the Sims position, and at her home where she can be kept quiet in bed during the period of their insertion. No anæsthetic is required for their introduction or removal, but in many instances pretty severe pain is felt during their dilatation. This can best be relieved by a powder of phenacetin (gr. iv.) and codeine (gr. ½), which I prefer, or by morphine. The tent selected should be one which can be readily passed through the internal os, its inner extremity should not reach much above this point, while its base should project somewhat into the vagina to facilitate its removal.]

B. Divulsion.—The advantage at times of immediate dilatation by force has given birth to many instruments of different shapes and powers. The dilator of Ellinger, with two parallel branches, is the one I prefer; Schultze, Sims, and others have invented special forms of instruments. But they are all objectionable, since they take their point of support from portions which are liable to yield and tear under the strain, and by themselves they do not suffice to make a passage admitting the index finger. The Ellinger dilator is very serviceable and convenient for facilitating the passage of the sound or the curette in cases of cervical constriction.

[Palmer's dilator, with the intra-uterine portion of the blades two and a quarter inches long and capable of dilatation to one inch, is most convenient and efficient for general use. Where a more powerful instrument is needed, Goodell's modification of Ellinger, with blades two inches long, corrugated to prevent slipping, and opening to a width of one and a half inches, is one of the best. For slight degrees of dilatation an anæsthetic is not necessary. To avoid tearing or unnecessary injury to the parts, dilatation should always be done slowly, occupying from ten to twenty minutes, with the least possible degree of force and preferably without the use of the screw attachment. It should be done through the speculum, with the patient either on the back or the side, the vagina being filled with a pool of antiseptic fluid in which the cervix is kept immersed.]

C. Immediate Progressive Dilatation.—This method is well known to surgeons, who apply it in dilating urethral strictures by means of graduated sounds. Of these there are many devised for the use of the gynæcologist; Peaslee's, which are actual steel sounds; Tait's, of conical form; Hanks', hard-rubber and ovoid; Fritsch's, and lastly, Hegar's, which are the most practical. They are cylindrical bougies of hard-rubber with conical ends, and measure twelve to fourteen centimetres (four and one-half to five inches) in length, ex-



c

FIG. 83.—*a*, *b*, PALMER'S DILATORS (*b*, latest model); *c*, GODELL'S DILATOR.

clusive of the flat handle (about two inches). The diameter of No. 1 is two millimetres and they increase by one millimetre per bougie (three millimetres in circumference); this increase is a little too rapid for the higher numbers, and, according to Hegar's own advice, it is well to have some bougies for difficult cases, which increase only by half-millimetres. They should be kept in strong carbolic solution.

To use them, the patient is anæsthetized and placed in the dorso-sacral position (Hegar prefers Sims' position), the fourchette is depressed with a short blade, the anterior cervical lip is seized and fixed

with a hooked forceps, the position of the uterus having been previously determined by the aid of bimanual palpation and the sound. Then the first bougie is covered with vaselin and passed in, and should be of a calibre which enters with but little resistance. Immediately afterward a second, and then a third are introduced, and, if any difficulty is encountered, the bougie is allowed to remain from one to three minutes or the previous one is introduced a second time.

When the cervix is naturally or artificially softened, it is possible to reach in fifteen minutes a sufficient dilatation to admit the index finger. When the cervix is dense, an hour or even more is necessary. The procedure must be abandoned if there is risk of laceration as soon as a sufficient dilatation is reached. Hegar's bougies are extremely useful if the cervix is already soft and dilatable, as it is directly after abortion or parturition; when, however, the cervix is rigid throughout its whole length, I recommend the insertion of a laminaria tent for ten to twelve hours to produce a certain degree of dilatation,

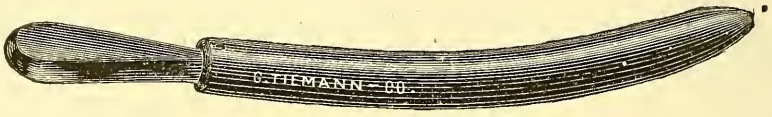


Fig. 84.—Hegar's Dilator.

softness, and dilatability, and at the time of its removal, the rapid completion of the process with Hegar's bougies.

Operation for Rapidly Dilating the Cervix by Incision.—Rapid dilatation of the cervix with a cutting instrument may be indicated where the obstacle to be overcome in passing the index finger within the cervix is at the external os alone; when there is a special urgency and no time can be lost, the cervix not being obliterated; or when the surgeon does not have the special apparatus needed for the bloodless method.

A. Incision of the External Os.—When the external orifice has spontaneously enlarged from the pressure of an intra-uterine polyp, abortion, etc., a simple cut in either side of the os will suffice for the introduction of the finger; then the bloody method is both most simple and rapid. Scissors with long handles are used, guided by the finger, after depression of the fourchette with a short Simon's blade and fixation of the cervix. The blades of ordinary scissors are apt to slip and therefore Küchenmeister's, though not indispensable, are to be preferred.

An incision of 1 cm. to 1.5 cm. on either side is enough for the passage of the index, which will accomplish the required dilatation itself. After the exploration is complete, the uterus should be irrigated and the cuts closed with catgut.

B. Complete Bilateral Division of the Cervix.—This procedure is so truly an operation that one should not undertake it if he has not already a large experience in uterine surgery. A necessary preliminary is ligation of the uterine artery.[28] The patient being anæsthetized and placed in the dorso-sacral position, the vagina is strongly retracted upon one side, while the cervix is drawn with a tenaculum toward the opposite side; in this manner one of the lateral vaginal pouches will be exposed. Then a long and strongly-curved needle, or better a Deschamp's needle, threaded with silk, is passed through the cul-de-sac across the finger outside of the cervix, taking care anteriorly

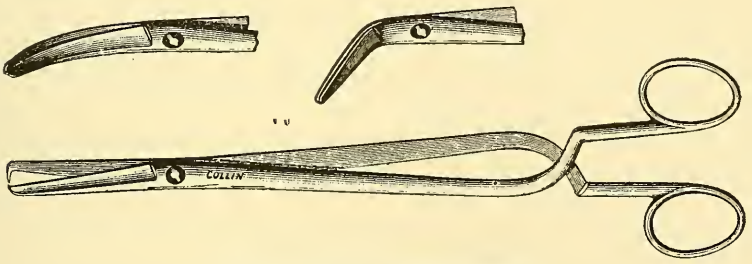


Fig. 85.—Kuechenmeister's Scissors.

not to go beyond a line tangent to the circumference of the cervix at that level in order to avoid the ureter. The surgeon must include the greatest possible thickness of tissue and must bring his needle out in the vagina posteriorly, as nearly as possible to the point of entrance and always at the same distance from the os. In thus keeping the points of the needle's entrance and exit close together, the surgeon endeavors to include as little as possible of the vaginal mucous membrane within the loop of his ligature. The silk is then firmly tied and the process repeated on the opposite side.

I have had occasion to make use of this preliminary ligation and can state that it is very efficacious. I think that it is not the main trunk of the artery which is included in the ligature, but probably its inferior branches; however that may be, the surgical result is excellent. One can then take up his bistoury with no fear of hemorrhage. The cervix being drawn down is incised on either side to the vaginal insertion, and then an attempt is made to intro-

duce the finger; should this still be difficult, a probe-pointed bistoury is passed in along the index and, in withdrawing it, the cervix is scored on its internal aspect on either side, until the finger has room enough to pass. As soon as the exploration has been finished, and the uterus irrigated, the cervix must be restored with great care. For this purpose a needle armed with catgut is passed through the cervix at the level of the vaginal insertion, so deeply that, with the finger as guide, the loop of the ligature lies at the highest point of incision within the cervical canal. It is well to make all the stitches on both sides, and have them symmetrical, before drawing the first tight; otherwise the orifice is narrowed at once and the finger no longer serves as a guide. The first two superior stitches being placed and tightened, a sufficient number are taken below to adapt the mucous membranes accurately, both within the canal and without.

It is needless to leave the ligature of the artery indefinitely in place; it may ulcerate and injure the vaginal mucous membrane; it should, therefore, be removed, unless there are special indications to the contrary, at the end of three or four hours. Of course its removal must be far more speedy if there is reason to fear that the ureter has been tied, but this accident may always be avoided if the directions given are minutely observed.

Permanent Dilatation.—The dilatation obtained in one of these ways may be maintained by tamponing the uterine and cervical cavities. The idea has lately been current that continued dilatation favors diagnosis and treatment in certain uterine affections, since it exposes the parts to view.

Vulliet,[29] who proposed this tempting procedure, thus describes it: The patient is placed in the genu-pectoral position, the cervix is exposed by a Simon's speculum, and its canal explored. If constricted or misplaced, its natural direction and calibre are restored by preliminary treatment; if it is normal, a small tampon of cotton is passed into its cavity with a metal sound. These tampons vary in size from that of a pea to that of an almond, and are each furnished with a thread. They are first plunged into a mixture of ether and iodoform (1:10), then dried and kept in a well-stoppered bottle. Vulliet introduces tampons until the cervix is full to the external os. These he removes at the end of forty-eight hours. If it has been well stuffed, the cervical walls have become soft and have so far yielded that there is free space for the operator, who at once takes advantage of it and packs in a much greater number of tampons than before. In pro-

ceeding thus with gradual increasing tamponade, there are at least eight or ten repetitions of the method before the canal is so wide that it may be seen in all its extent. To save time and regulate the calibre of the cavity, Vulliet advises that the tamponing be alternated with laminaria tents.

This procedure is not always applicable in the conditions indicated by its author. There are a certain number of cases where the requisite calibre cannot be obtained, as the observations of Porak and Sabail demonstrate; and there are other cases where the repetition of the tamponade must be given up, either because of the pain produced, or because of nervous accidents; these latter symptoms appear to be due to the nature of the operation itself, not to the absorption of iodoform from poorly made tampons. Moreover, I do not think that vision furnishes more satisfactory information about the uterine cavity than can be gained by the different exploratory methods already described. Nor do I think that therapeutics have been greatly advanced by this plan; or that it will survive, ingenious as it may be, a legitimate interest, mixed with some astonishment, provoked at the moment of its appearance.

These remarks do not apply to hæmostatic or antiseptic tamponade (Fritsch's) of the uterine cavity, for I believe that this procedure will be retained in practice and more frequently employed.

The touch, by the introduction of the index finger into the uterine cavity, takes note of the softness or villosity of the mucous membrane, of vegetations, tumors, or abnormal projections which may exist there, and the manœuvre should be always combined with hypogastric palpation. It must be very rapidly carried out, and followed by an intrauterine injection of carbolic solution (1:100), an iodoform tampon, and absolute rest in the horizontal position for two days. If the hemorrhage occasionally produced does not yield to very hot injections (115° to 120° F.), there should be no delay in filling the cavity with iodoform gauze tampons for a few hours.

Exploratory Incision and Curetting.—Diagnosis between malignant and benign growths is so important from an operative point of view that we should not hesitate to make an exploratory incision in doubtful cases. There may be alterations in the cervix where a doubt as to their nature could be settled only by an operation dangerous to the patient. I remember an excellent instance: My regretted master, Gallard, suspecting cancer, sent me for operation a woman who had a hard, irregular cervix and a bloody discharge. Though inclined

to accept the diagnosis, it was with some reservation, and so I removed a small section from the cervix; the microscope showed simple chronic inflammation. She had escaped another surgeon who was just about to operate.

This mode of exploration has been praised by clinicians as of great value.[30] The technique is very simple; fixation of the cervix, excision of a wedge-shaped piece with sharp scissors or a bistoury, thermo-cautery if necessary for the bleeding, since an antiseptic tampon may allow the flow to continue.

When it is necessary to determine the state of the uterine mucous membrane, scraping it with a cutting curette furnishes us with shreds enough for examination. Martin,[31] who is a great partisan of this method, advises not to stop with partial curettage, but to make it complete and follow it with antiseptic irrigation and the injection of (2 or 3 gm.) perchloride of iron. The technique of the process will be described in the chapter on Metritis.

Exploration of the Ureters.—This entire subject is of recent date. In 1874, Tuchmann collected the urine from one ureter by compressing the other; Hegar, at the same time, proposed tying the ureter per vaginam for this purpose. But it is not until very recently that Simon (1875) was able to catheterize the ureter by the guide of the finger placed in the bladder after urethral dilatation.[32] For the same purpose Grünfeld employed the endoscope. But Pawlik,[33] in 1880, discovered a method which cannot be called easy and yet is more or less practicable, by which to enter the ureter directly without previous operation, guided by external anatomical landmarks. Later labors of Newmann,[34] Kelly,[35] and Byford[36] have not added anything important to Pawlik's method. More recently Sänger[37] (1886), more clearly defining the indications already sketched by Hegar, Chrobak,[38] and Pawlik, attempted to introduce into practice vaginal palpation of the ureters; I have seen Pawlik and Sänger demonstrate their method. Without attempting to give historical details, which will be found complete in their works and which have been summed up by Schultz[39] in a recent review, I will simply try to give an idea of the technique of these two skilled gynæcologists.

Reversing the chronological order for the logical, I will describe Sänger's method.

A. Palpation of the Ureters.—The anatomical relations of these ducts with the cervix and vagina have been studied with especial care of late because of their importance to the success of certain oper-

ations which have become the order of the day.[40] As is well known, it is possible to feel through the vagina the anterior pelvic portion of the ureters, if injected, in the cadaver, just where they open into the bladder at the base of the broad ligaments; this is equal to a length of 6 or 7 cm. (2½ in.), that is, the greater part of the ureters within the pelvis and about one-fourth of their whole length. In pregnant women we can feel as much as 10 cm. (4 in.), owing to the general muscular hypertrophy which all the pelvic organs undergo at that time. More-

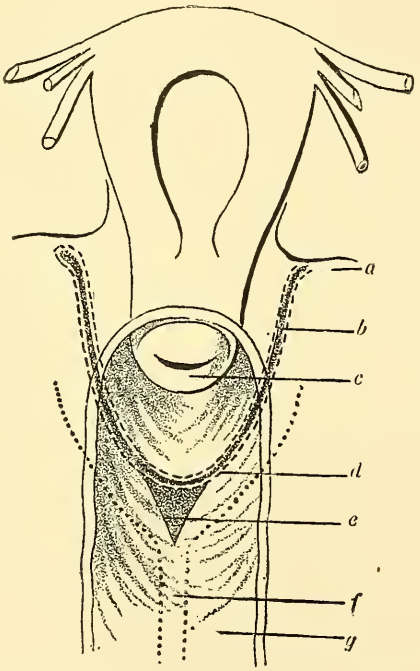


FIG. 86.—THE PORTION OF THE URETERS ACCESSIBLE TO TOUCH. (Figure diagrammatic; the posterior vaginal wall supposed to be removed and the ureters visible through the anterior wall.) *a*, Base of broad ligament; *b*, ureter; *c*, cervix; *d*, ligament between the ureters; *e*, trigonum; *f*, urethra; *g*, vagina.

over, one can take his supporting point from the head of the fœtus and feel the ureter against that structure.

In some cases of gonorrhœal and calculous inflammation of the ureters, Sänger was able to diagnose by touch that they were remarkably enlarged. Where there is a chronic inflammation of the broad ligament the ureter is found to be very large and palpable upon the other side, as if from hypertrophy. Under Sänger's direction I have been able to touch the ureters in pregnant women, but on attempting to repeat it at several different times, the result has always seemed

uncertain to me. Probably by reason of the great difficulty, and the doubtfulness of its results, as well as the rarity of practical conclusions furnished, the operation is not likely to become general. To employ the method, several anatomical points must be held clearly in mind. The field of investigation is limited to the upper portion of the anterior vaginal wall. Diagramatically the surface is a trapezium with oblique and divergent sides corresponding to the union of the ureters and the junction of the anterior with the lateral vaginal wall. The small base of this trapezium, which is really the truncated apex of a triangle, is placed below and horizontally, corresponding to the ligament between the ureters; the larger base is above, formed by the point of exit of the ureters from the broad ligaments and a line joining them. In this space the finger encounters, in certain circumstances, 1 or 2 cm. ($\frac{1}{2}$ to $\frac{3}{4}$ in.) behind the os externum, in the depth of the vaginal pouch, two hard, longitudinal cords, one on each side, directed from without inward and from below upward, making a curve which is concave inward (Fig. 86, *b*). One cannot ordinarily trace them through their whole accessible length, which is 6 or 7 cm. ($2\frac{1}{2}$ in.) to the base of the trigonum; about 2 cm. is all that can be usually palpated.

The ureters are normally symmetrical, but they cease to be so after different lesions, and then their direction may vary from cicatricial contraction so much that the ureter of one side may be found upon the other; or their concavity may be directed upward instead of inward; or, finally, but one ureter may be palpable.

The average normal diameter of the ureters is 1 mm., but diseased, it may reach the volume of a goose-quill or even a large crayon. They are more or less movable under the finger, or fixed in place by inflammation, and normally they are not sensitive to pressure, though they may become so if diseased.

To touch them by the vagina one must proceed in the following way. With the index, trace up the urethra to its exit from the bladder, which brings the finger into the anterior vaginal pouch; there notice the direction of the cervix. To find the ureter we must seek in that portion of the anterior vaginal wall which is comprised between the internal orifice of the urethra and the anterior vaginal cul-de-sac. This region has an extent of not more than 2 to 5 cm. ($\frac{3}{4}$ to 2 in.) and is remarkable for its loose attachments. With the lateral surface of the tip of the finger the vaginal wall is palpated to the front and side in the direction of the broad ligament, using the finger corresponding

to the ureter sought. The left index can be used for the right ureter and *vice versâ*, but in that case it is the palmar surface which palpates. It is necessary to work gently, with a gliding motion, and not by frequently applying and removing the finger. Delicate palpation demonstrates whether the ureters are normal or a little hypertrophied; they have the feel of an artery deprived of its pulsation. When one can compress them against a hard body, like the pelvic bones or the fœtal head, they roll about within their sheaths. Palpation is more readily accomplished when the vaginal wall is very flaccid.

The ureters must not be confounded with arteries, cicatricial bands about the uterus, or, according to Sänger, with the levator and sphincter ani. These errors may be avoided if one takes strict account of both their anatomical and their abnormal positions. It is none the less very difficult, without special training, to employ with profit this new exploratory method of the eminent Leipsic gynæcologist.

Catheterism of the Ureters.—Pawlik's method. It was during his stay in Vienna as privat-docent that Pawlik, now professor at the university of Prague, made his first experiments toward his ingenious method in a case of doubtful diagnosis occurring in Billroth's clinic. I had an opportunity at the time of seeing and verifying the marvellous dexterity with which he accomplished the delicate manœuvre. There are cases where it is of the greatest importance to determine whether both kidneys are diseased or only one; Pawlik made the matter perfectly clear on one memorable occasion, and on another diagnosed a hydronephrosis and allowed the ureteral sound to remain in position. For this latter procedure, he constructed a special instrument (Fig. 88), but it is not free from all danger; for the metal piece which, in this instrument, is fastened to the long rubber sound, could not be removed, if separated, without an unusually fortunate combination of circumstances.

Certain anatomical points must be clearly understood beforehand in order to use Pawlik's method. In front of the lowest part of the bladder, on the posterior portion of the antero-inferior wall, the ureters are found at the posterior angles of the trigone, and the anterior is occupied by the urethra. Each of the three orifices is at the top of a papilla, which is more or less prominent, of an irregular cylindrical form, made by a thickening of the muscular coat and invested by mucous membrane. These papillæ serve as land-marks. They are, moreover, connected by a marked band of the same formation, convex forward, thick and resistant enough to hold the point of a sound at

its middle (Pawlik), where it is somewhat thinned, and to be appreciated by direct palpation (Simon). This fold is called the inter-ureteral ligament, the pad or muscle of the ureter; it forms the curved base of Lieutaud's triangle, the other sides being indicated by less marked folds which point toward the urethra and become thinner. The dimensions of this triangle are naturally inconstant, but it is usually almost equilateral. Its base is estimated at 2 cm. 6 mm. to 4 cm. ($\frac{7}{8}$ to

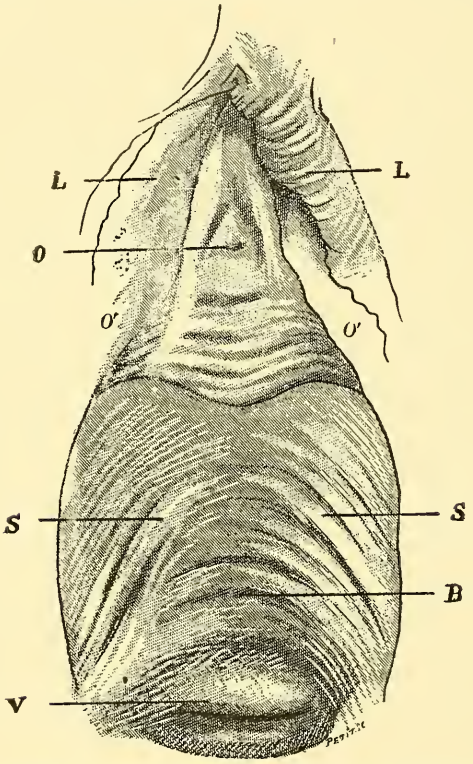


FIG. 87.—THE VESICAL TRIGONE (PAWLIK). *L*, *L*, Labia minora; *O*, urethral orifice; *O'*, *O'*, urethral cushion; *V*, os externum; *B*, fold of mucous membrane, behind inter-ureteral ligament, forming base of triangle; *S*, *S*, lateral fold, converging and corresponding to the sides of the triangle.

$1\frac{1}{2}$ in.) (Simon, Quain, Hyrtl); its sides, at 2 cm. 7 mm. (Simon), 2 cm., and 2 cm. 8 mm. (Warnoots) or at 4 cm. (Hart) (1 to $1\frac{1}{2}$ in.). The distance between the urethral opening and the middle of the base is given as 1 cm. to 2 cm. (Warnoots) to 3 cm. (Hart) ($\frac{3}{8}$ to $1\frac{1}{8}$ in.).

Pawlik has the patient put in the genu-pectoral position, but one can quite as well do the operation in the dorso-sacral; it is only necessary in the latter position to have the head well lowered and the buttocks strongly raised, that the viscera may fall toward the dia-

phragm. A Simon's speculum, as large as possible, is put into the vagina and the posterior wall depressed; the anterior wall is thus perfectly stretched.

This tension of the anterior vaginal wall allowed Pawlik to note certain permanent folds of great importance topographically. He mentions near the external orifice of the urethra a pad or cushion elongated from before backward in the median line, folded or furrowed transversely and well marked, which corresponds to the course of the urethra within the wall (tubercle and anterior column of the vagina). This fold terminates at the internal meatus. Next there follows a triangular space corresponding to the base of the bladder or the trigone of Lieutaud. This space is bounded posteriorly by the inter-ureteral ligament, slightly convex forward, having the orifice of a ureter at each end of it. The lateral folds diverge from before backward and end about 1 cm. ($\frac{3}{8}$ in.) behind the internal meatus, thus forming the truncated apex of the triangle (Fig. 89).

It can be demonstrated upon the cadaver that the vaginal triangle thus bounded corresponds line for line with the intra-vesical trigone of Lieutaud, and should therefore be called Pawlik's vaginal trigone.[41]

Pawlik uses a catheter which has a probe-pointed extremity, about 25 cm. in length with a tip of 1.5 mm. diameter; the eye of the catheter is very much elongated, with bevelled edges, and is situated on the base of the point of the instrument on a slight curve continuous with the main stem, which tapers a little. At 1.5 cm. from the other end of the catheter is attached a holder, of octahedral shape, which carries a mark corresponding to the curve of the instrument, and beyond this handle the tube projects for about 1.5 cm. more.

To render the instrument aseptic the stylet is withdrawn and the instrument washed out with

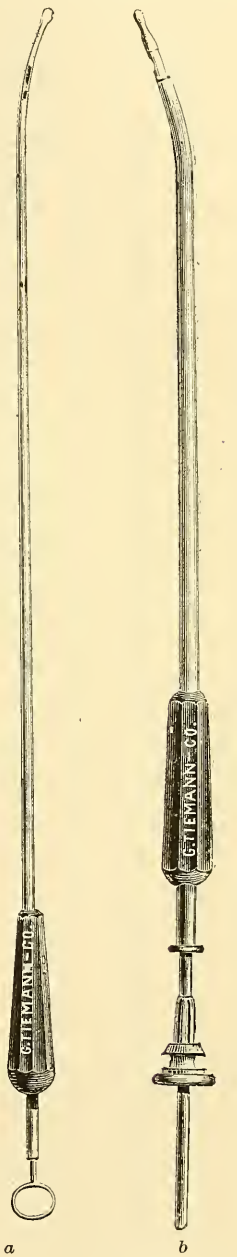


FIG. 88.—PAWLIK'S URETERAL CATHETERS. *a*, With stylet; *b*, permanent form with rubber tube which is passed through a metal sheath.

water; then it is filled several times with ether, and finally passed through an alcohol flame. Before introducing the catheter, there should be a certain degree of vesical distention, and the shortest and surest way to obtain this is to empty the bladder completely and then inject (200 cc.=6 oz.) of water, which is plenty for moderate distention. The urethral catheter is then removed and the ureteral passed in.

As soon as this instrument has passed within the internal meatus, the other end of it should be raised so that the tip shall be brought toward the recto-vaginal pouch at the level of the trigone. As the instrument is pushed gently in, its beak makes a slight prominence on the anterior vaginal wall, and as it passes onward, this prominence changes its place; thus the catheter can be guided, following the sides of the vaginal trigone and moving from within outward and behind forward, toward the orifice of the ureter. In this direction it meets the inter-ureteral ligament or fold at its most projecting outer part; while, if it is held in the median line, it may pass over the middle of the fold, where it is flattest, and so miss it entirely. Arriving at the ureteral orifice, it is held there while small movements of gliding, rotation, elevation, and depression are made, until it has passed in; but always without leaving the angle of the trigone, which is kept constantly before the eye. Once within the ureter, the instrument is pushed 1 or 2 cm. ($\frac{1}{2}$ in.) toward the posterior vesical wall. The entrance of the catheter is appreciated by the sudden removal of all resistance; it advances as into an empty space; while, on the contrary, lateral and downward movements of the handle are resisted more and more as the instrument advances. At the end of a certain time the urine flows in a jerky stream, while, as is well known, from the bladder it would be continuous. If the catheter is passed still further in, it changes its direction at the superior strait and then it is time to arrest the procedure on account of its difficulty, which is specially great where the urethra is tightly fastened to the os pubis and but little dilatable, as in nulliparæ; if, however, the urethra is large and soft-walled, the catheter may be passed still further. It should be pushed on with the greatest gentleness as the other end is depressed as far as possible. On the other hand, this latter half of the process is as easy as the first, when one has entered a fistula in the bladder or urethra. I once was able to pass Pawlik's sound to the pelvis of the kidney, but it was not per urethram. I had introduced it into a vesico-vaginal fistula which I had reason to suspect was connected with the ureter, and I was able to confirm the diagnosis.

Thus one may reach the pelvis of the kidney; the ureter is then dragged into a straight line. Ordinarily in contact with the pelvic wall, it is then pulled away to a distance of about 4.5 cm. ($1\frac{3}{4}$ in.), but the cellular tissue which surrounds it will permit this degree of displacement if it is in normal condition; ureteral catheterism should therefore be carried out with the utmost gentleness, especially if there is reason to suspect any inflammation about these tubes.

The only troublesome results which I have been able to verify, are fever, abdominal pain, which does not last more than twenty-four

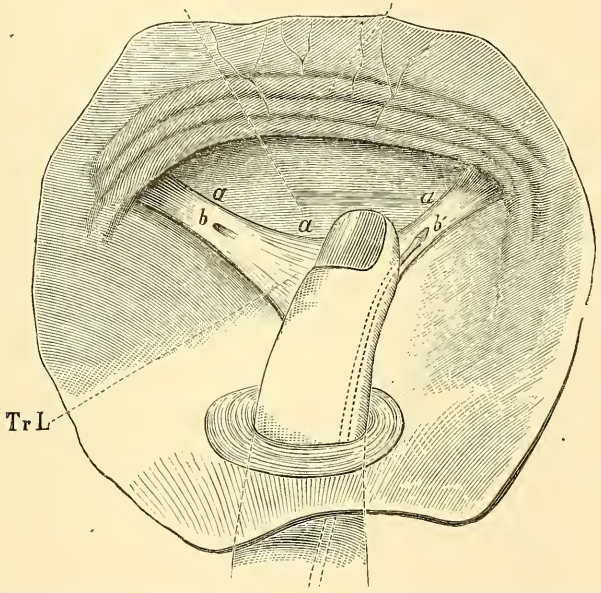


FIG. 89.—URETERAL CATHETERISM BY SIMON'S METHOD. The instrument is slid along the finger whose tip rests upon the inter-ureteral ligament. *a*, *a*, *a*, base of the bladder; *b*, *b*, orifices of the ureters; *Tr L*, Lieutaud's triangle.

hours, or a slight degree of peritonitis (in a case where it had already been present); in the urine, furthermore, we may find blood, epithelial débris, products of traumatism of the ureter. It seems possible that there might be a ureteral fever, similar to the urethral, which would be a serious accident to follow such catheterism. We must wait till the procedure has been more frequently employed before observations become numerous.

Simon's Method.—If exploration of the ureter is considered necessary and Pawlik's method cannot be carried out after several attempts, then Simon's method may be employed; which comprises

anæsthesia, urethral dilatation, introduction of the catheter along the finger, which immediately feels the inter-ureteral ligament. Incontinence of urine need not deter, for it seldom lasts long. This older form should be adopted where the operator has had no special training in Pawlik's method, as being the more certain of the two. Different plans have been proposed for compressing or tying the ureter from the vagina for diagnostic purposes. Narkalla [42] has recently lauded exploratory compression by a thread passed over the ureter from the vagina. He succeeded in doing this on the cadaver ten times in thirty. According to this author the operation offers no danger, since instead of tying the thread, he merely used gentle traction upon it, to shut off the ureter temporarily. I prefer catheterism to this manœuvre.

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CHAPTER V.

THE PATHOLOGY AND ETIOLOGY OF METRITIS.

Definition.—According to its etymology, metritis is inflammation of the uterus, and I shall hold to this general definition although it might call for a long commentary. But it is enough that I am understood, and the word has a decided clinical value. The generic term inflammmation is applicable to all morbid states where the anatomical substratum is reduced by irritative lesions without resulting in the formation of specific neoplasms. How numerous and varied these lesions may be we shall soon discover. But they are all to be grouped under the same head because of the infectious nature of their origin as well as by their defensive character and limited evolution. When there is mucous or parenchymatous proliferation, the entire process takes place as circumscribed local irritation, coming to a focus either externally or internally, with no tendency to pass certain bounds; this distinguishes inflammation from neoplasms properly so-called. Do there exist, aside from metritis, "morbid states without neoplasm" which need to be distinguished? Basing their opinion upon dogmatic ideas and a narrow conception of inflammation, the ancient authors did not hesitate to reject from the class of metritis all states which did not fall under the fourfold division of "tumor, rubor, calor, dolor." Granulations, ulcerations, and leucorrhœa belonged in consequence to other diseases. There are traces of this scholastic prejudice to be found even up to the modern writers, Alph. Guérin and Courty.[1] Does not the latter author devote separate chapters to fluxion (inflammation), congestion, engorgement, œdema, hypertrophy, subinvolution, and granulation and ulceration of the cervix? It is necessary only to run the eye along his tables, so laboriously prepared with the view of differential diagnosis of the various morbid entities, to be at once convinced of the folly of parallel tabulations.

A very necessary distinction is the following: the idea of the lesion must not be confounded with the disease. This is what the various authors wish to indicate by the use of the terms idiopathic

and symptomatic metritis; ill-chosen language which we will not adopt. The word metritis should remain a clinical term and not a pathological. It is thus that we shall study the malady and its pathology is but the supplement thereto. Because there are lesions of endometritis with a fibroma, or of metritis with carcinoma, shall we therefore describe a myomatous and a carcinomatous metritis? That would have but one effect—confusion.

Truly our distinctions are somewhat artificial, because they must be sharply defined and there is nothing absolute in nature; they are none the less indispensable, and quite justifiable if one is careful to explain upon what criterion they are founded. I have already said that ours is clinical; it is the only one which gives personality to a disease. I cannot leave the subject without a few words on pseudo-metritis, the so-called symptomatic metritis. Inflammatory changes in the uterine mucous membrane are almost constant with fibromata, and to this fact we may undoubtedly ascribe the bleeding. Wyder's[2] monograph on the subject is very complete. The irritation in these cases travels by continuity step by step. In the same manner, but in a reverse direction, it can follow reflex congestions, which predispose to infection, after disease of the adnexa. This pseudo-metritis, as I have termed it, has been classified by Czempin[3] under different heads according to the point of origin as follows:

1. Chronic oöphoritis, of one or both sides, with or without participation of the tubes.

2. Exudative parametritis with exacerbations.

3. Pelvic peritonitis after removal of ovaries or tubes, starting in cicatrices of the broad ligaments.

4. Tumors of slow growth in the adnexa (pyo-salpinx, sarcoma, and carcinoma of the ovary).

The peculiar characteristic of pseudo-metritis is, that the inflammation of the uterine mucous membrane is merely an epi-phenomenon of tardy development and not appearing at the first onset, which becomes evident only after the appearance of disease in the adnexa or the pelvic peritoneum.

Brennecke,[4] even before Czempin, had described a hyperplastic ovarian metritis, occurring chiefly at the menopause, marked by continued or typical hemorrhages, and equivalent to the hyperplastic form upon which Olshausen insisted.

Classification.—Turning now to the study of metritis proper, and its various forms, if we consult the authors we shall find the most

widely different starting-points for classification; they take the progress of the disease and term it acute and chronic; or the location of it, and describe cervical and corporeal endometritis, parenchymatous and idio-metritis; or from its cause, it is puerperal, post-puerperal, gonorrhœal, traumatic, etc.; or from its pathology, it is styled granular, fungous, ulcerating, etc. For our purpose these schemes all have the defect of being as systematic and artificial as Linneus' classification of plants. They are founded upon some character, arbitrarily chosen, whose value is not so great that all authors should be fairly dominated by it. But in order to reach a classification as natural as

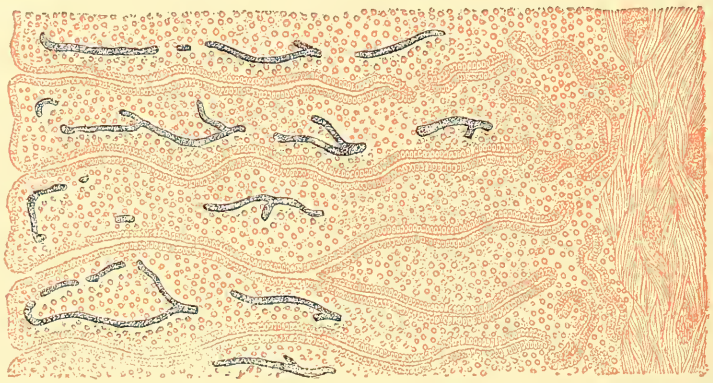


FIG. 90.—NORMAL MUCOUS MEMBRANE OF THE BODY OF THE UTERUS,[1] SLIGHTLY ENLARGED (WYDER).
(Mucous surface to the left; muscular tissue to the right.)

To the naked eye the uterine mucous membrane differs from the cervical in being smoother. Under the microscope it is seen to consist of collections of embryonal cells and tubular glands. These embryonic connective tissues are essentially homogeneous, rich in round and fusiform cells, which are found scattered through the muscular base of the membrane, along the vessels and glands, and here and there in the thickness of the tissues; both forms, especially the round cells, are characterized by their single large nucleus surrounded by a thin layer of protoplasm. The tubular glands cross the interglandular tissue almost perpendicularly, and at the muscular layer are branched, piercing the thin layer between the connective-tissue bands which separate the muscular bundles. The limit between muscle and membrane is sharply cut throughout. The surface of the mucous membrane is covered with a single layer of ciliated cylindrical epithelium. The mucous membrane of the body is further distinguished by the wealth of its arterial supply and the poverty of its venous. The arterioles pierce the layer perpendicularly, give off many little branches which enter the glands, then recurve and cross immediately below the epithelial investment, forming an irregular plexus of large capillaries, whence the veins originate.

possible, following in disease the definite rules propounded by Jussieu for botany, we have a guide that we can follow—the clinic. Truly, if lesions were always circumscribed, and if to such definite lesions a particular group of symptoms always corresponded, then we should have in the anatomical method the most logical system possible; but

[1] In order to estimate tissue changes correctly, we must know the normal histology of the part, and I have therefore prefixed to figures of morbid tissues one which presents the healthy condition; this is indispensable for comparison.

while this condition does not exist, the anatomical basis lacks all precision and serves but for illusions.

I propose, therefore, to classify metritis according to the prevailing clinical symptom which may be deduced from its course, or may stand in marked predominance in the order of its symptoms. We have, accordingly, the following varieties:

1. Acute inflammatory,
2. Hemorrhagic,
3. Catarrhal,
4. Chronic painful.

These epithets shall have only a taxonomic or classifying value henceforth, and any other adjective will be used, when necessary, to give them a purely descriptive force.

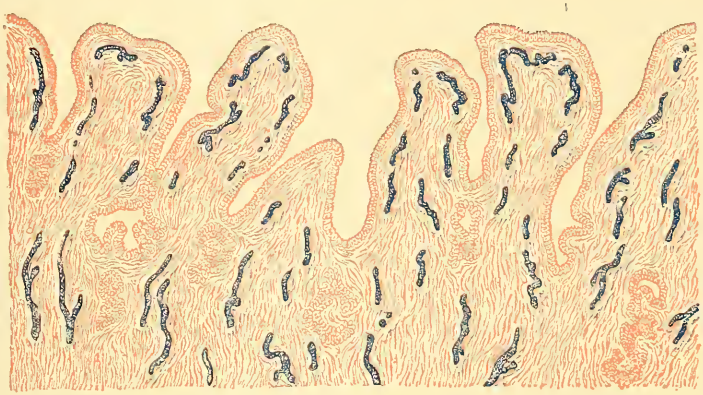


FIG. 91.—NORMAL MUCOUS MEMBRANE OF THE CERVIX, SLIGHTLY ENLARGED (WYDER).

The mucous membrane of the cervix is very firm and presents a number of branching folds (arbor vitæ). The interglandular tissue, which has in the body of the organ the nature of granulation tissue, is here of a connective-tissue type, the fusiform and stellate cells predominating. There is not the same clear limit between membrane and muscular coat; and one can follow the glands deeply inward among the connective-tissue bands which separate the muscular bundles. Consequently the mucous membrane in section has a partly reticulated, partly fasciculated appearance. The cervical membrane possesses, moreover, many vascular papillæ. Cylindrical ciliated epithelium invests the glands in the adult, and in the child extends to the external os. In the adult, especially after pregnancy, the flat vaginal epithelium rises higher and lies more or less within the cervix. Between the superficial cylindrical epithelium and the glands, cup-shaped and colloid cells are here and there present.

The vessels (Moericke) pass into the mucous membrane perpendicularly and have very thick walls, dividing progressively into a capillary plexus, which is less developed than in the body. Sometimes the capillaries lie very superficially under the epithelium, reuniting to form veins, which at once leave the mucous membrane. The glands and ovula Nabothi are surrounded by the vessels.

Pathology.—For the methodical description of the lesions found in metritis, it is necessary to depart from the clinical arrangement and follow the topographical order, first considering lesions of the body and then those of the cervix.

In most of the treatises on metritis the division is still maintained of acute and chronic parenchymatous, and internal (or mucous, *i.e.*, endometritis), and both the pathology and clinical study of the

disease are arranged accordingly. I have said that I do not adopt this plan clinically, but yet I take advantage of it for the study of the lesions. As Sinéty[5] so justly remarks: "How shall we imagine that the mucous membrane presents the lesions of an acute disease without participation of the tissues below? Or how shall we suppose that the glands are involved without observing at the same time that there is an alteration in their lymphatic sheaths which communicate freely with the lymph-spaces of the parenchyma?"

I shall first describe the lesions of acute metritis throughout all the uterine tissues and then those of the chronic form.

FIG. 92.—SECTION OF NORMAL UTERINE MUCOUS MEMBRANE, FROM THE BODY OF THE ORGAN. × 200. (CORNIL.[6]) *a*, Epithelial lining of the glands; *b*, layers of flattened cells in the limiting connective tissue; *c*, connective tissue with round and ovoid cells multiplying; *d*, neighboring gland, the wall partly omitted; *p*, *p*, folds in the gland wall involving both connective tissue and epithelium.

Acute Metritis.—The descriptions which have been given of the parenchymatous lesions of acute metritis all suffer from one defect: non-puerperal metritis is not fatal and does not justify hysterectomy, and hence descriptions of lesions of the uterine mucous membrane and parenchyma, based on the autopsy of women dead in the puerperal state, are not comparable to those which should be found in acute inflammation of the non-gravid uterus. We ought to free our minds of this ancient idea of Chomel's, who described all the accidents of septicæmia after parturition as puerperal metritis. When a woman succumbs to such accidents, there is certainly present a septic inflammation of the entire uterine tissue, but this is merely an additional

circumstance which defines the general septic condition which proves fatal. It is only then that the pathologist alone has the right to speak of a septic puerperal metritis, marked in life by vague resemblance to acute metritis. This transposition of terms has been so often repeated since Aran that it has become trite.

These authors note the increase in volume, the softening of the tissue, the red color mottled with yellow, the vascular dilatation, and

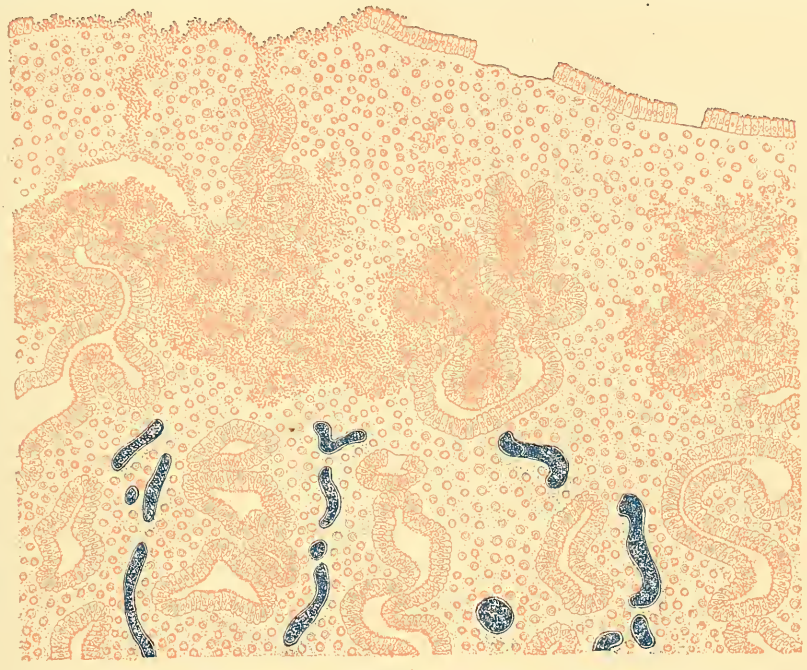


FIG. 93.—NORMAL MUCOUS MEMBRANE OF THE UTERUS DURING MENSTRUATION (WYDER).

A preparation of the layer removed by curette during menstruation. The figure reproduces the upper third of the membrane. There are small extravasations here and there, in the deeper parts is almost normal interglandular tissue, the glands being somewhat more sinuous than usual. The blood-vessels are full; the upper layers are partly normal, partly infiltrated with blood-cells; the epithelium, for the most part preserved, is here and there raised from its seat and covered with altered blood-cells; hemorrhage into the glands in places; no appearance anywhere of the fatty degeneration described by certain authors (Williams, Kundrat, Engelmann). It is very likely that sometimes during menstruation part of the mucous membrane is destroyed (Leopold, Wyder), and that there is no such desquamation at other times (Moericke). This figure shows that the different changes may be simultaneous, and that there is great diversity in the process.

the shedding of the mucous membrane. Finally, to complete the cycle of acute inflammation with pus-formation, most authors blindly repeat a number of ancient observations which are all exposed to hostile criticism. Their pretended uterine abscesses are either collections of pus in the neighborhood, as in pyo-salpinx, or suppuration in a degenerated myoma, neither of which bear any relation to metritis.

Of the two cases reported by Schröder, one, post partum, seems to be a simple parametritis· the other, opened by the rectum after uterine

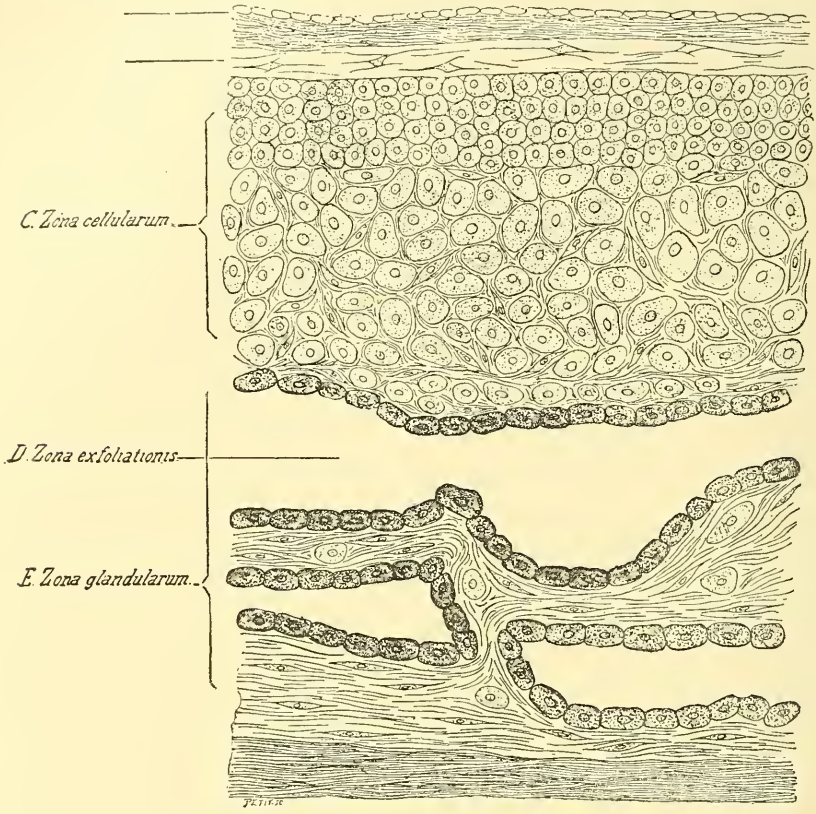


Fig. 94.—Normal Placenta (Friedlaender, Wyder).

The figure is largely diagrammatic, for the sake of clearness. It represents the placenta at the end of pregnancy. This membrane is the product of two factors, viz., proliferation of the uterine mucous membrane in all its elements, and compression of this hypertrophied mass by the enlarging ovum. There are thus two layers, the cellular (zona cellularum) and the glandular (zona glandularum). The former lies close to the fœtal membranes (amnion and chorion), and is made up of cells which measure 2 μ to 61 μ in diameter; superiorly they are round, but below they become fusiform. Intercellular tissue is altogether lacking, or present as a trace merely. The glandular layer shows a plexus of flattened alveoli, not very long or wide, not communicating with each other freely, empty or filled with granular matter. The layers which separate these alveoli are formed of connective tissue, richly supplied with vessels and infiltrated with lymph cells. They are covered on the internal surface by epithelium; in places pavement, in others cylindrical.

The zona exfoliationis, or separating line between the two layers, is produced almost always in the cellular layer (Friedländer) and but seldom in the glandular; the opposite is the case according to Langhaus, Hüstner, and Leopold. The above figure, after Friedländer, is modified according to the views of his opponents, who seem to be correct (Wyder). The glandular cavities thus opened by placental separation furnish the regenerated epithelium of gland and mucous membrane after parturition.

sounding, was probably suppuration of the tubes. This latter explanation must be given also to the case of Hérvey de Chégoin,[7] so often cited

A. Martin[8] has related a case which was suppuration of a myoma but which exactly simulated uterine abscess. J. B. Kirkpatrick[9] has lately published a case under the name of uterine abscess where the cavity of Retzius was invaded and the pus appeared at the umbilicus —probably a parametritis.

Surely, if one would assert that suppuration of the uterine wall is possible, we should agree with him; but that it occurs as part of the clinical picture we call metritis—that we deny.

Our most trustworthy source of information as to the acute lesions of the mucous membrane is found in examination of the membrane

FIG. 95.—ACUTE SEPTIC METRITIS. Slightly enlarged view of entire uterine wall. *a*, *b*, Surface of mucous membrane; below are seen sections of muscular bundles.

of membranous dysmenorrhœa. The mucous membrane is abnormal both in softness and thickness; the microscope shows no change in the glands but a peculiar alteration in the interglandular tissue; the cells being far more numerous than usual and so tightly packed against each other that there is almost none of the homogeneous intercellular substance left. They preserve their normal volume and differ in that respect, and in the small amount of their protoplasm, from the cells of the placenta. In other words, we have to do (Fig. 96) with an acute interstitial inflammation.[10]

Chronic Metritis.—The parenchymatous lesions of chronic metritis are particularly characterized by a hypertrophy of the connective

tissue, causing a general enlargement of the organ, which, however, does not exceed the size of a fist. This increase in volume may be absent altogether, and then we have a decrease in the size of the organ. Theoretically there are two stages, according to Scanzoni:[11] the one of infiltration and the other of induration. The first of these corresponds to an active or passive congestion of the uterus, where the vessels are so dilated that the wall of the organ has an almost areolar aspect. There are great numbers of embryonal nuclei throughout the thickness of the tissue. The predominating change is hypertrophy

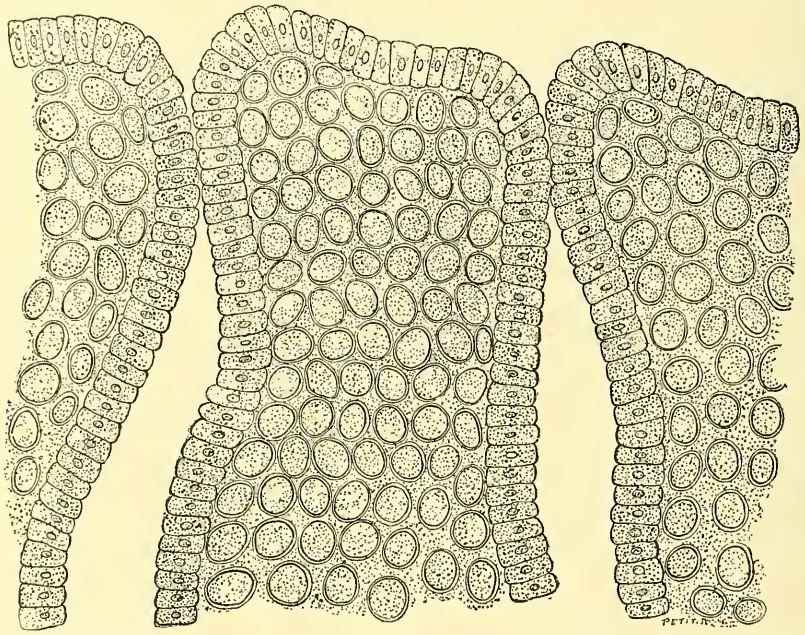


Fig. 96.—Acute Endometritis, Membranous Dysmenorrhœa (Wyder). Strongly magnified.

of the connective tissue, but authors are not agreed as to the participation of the muscular tissue in this hypertrophy. Finn,[12] of St. Petersburg, admits the hypertrophy but denies the importance of the fatty degeneration described by others. De Sinéty has discovered in one case a considerable dilation of the normal lymph spaces, and hyperplasia of the perivascular connective tissue which diminishes the calibre of the vessels and gives rise to a special form of sclerosis. The muscular tissue does not seem to be involved.

When the uterine parenchyma has thus been the seat of profound and lasting inflammatory processes, it is unusual not to have with it evidences of perimetritis, adhesions in Douglas' pouch with displace-

ment of the organ, and traces of salpingitis and inflammation about the tubes and ovaries. The uterine mucous membrane in always involved to a greater or less extent.

In many cases of endometritis of the uterus and the cervix, independent of parturition or occurring in aged women who have had children long before, Cornil[13] has found hypertrophy of the uterine wall due entirely to a new formation of adult connective tissue between the muscular trabeculæ. To the naked eye, the muscular tissue is then of a pale red color, presenting a series of opaque lines which are thickened and sclerotic arterioles in a state of atheromatous

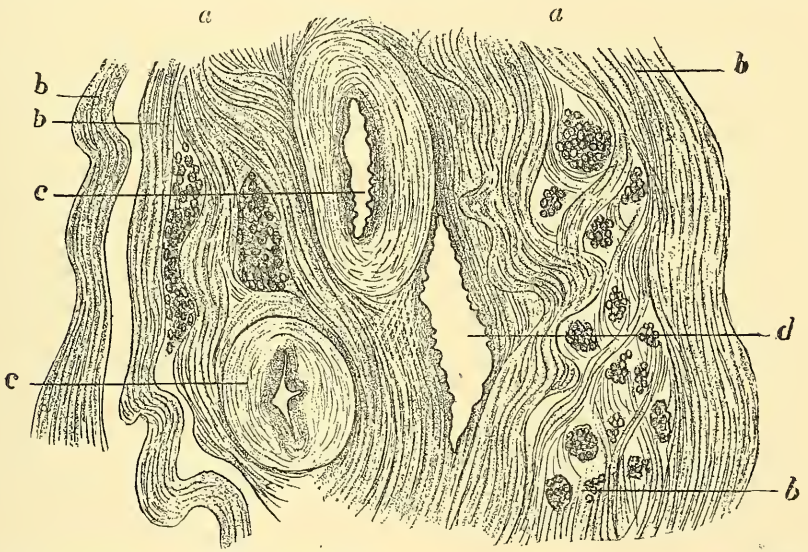


FIG. 97.—CHRONIC METRITIS. *a*, *a*, Muscular tissue traversed by bands of smooth connective tissue; *b*, *b*, connective tissue; *c*, *c*, vessels with thickened walls; *d*, lymph space.

degeneration. Under the microscope this thickening of the vessel-wall is found to be considerable, the elastic elements are increased and present also numerous cells in fatty degeneration. The connective-tissue sclerosis corresponds to that of the arterial and venous coats, and is not so much a cicatricial contraction of the connective tissue as a permanent augmentation of its volume. The microscopic and histological lesions of the mucous membrane under chronic inflammation are to-day perfectly understood, thanks to the operations which permit the study of so many fresh specimens of this disorder.

I cannot better describe the usual appearance of a uterine mucous

membrane thus altered, than by reproducing the words of Cornil in his recently published "Leçons;"[14] his description applies especially to chronic glandular endometritis, the more common form:

"The mucous membrane does not present its normal whitish color, smooth surface, and peculiar rigidity; it is bloated, pulpy, soft, and both in aspect and consistence resembles currant jelly; the discoloration is, in places, very marked and may have the appearance of a layer of blood interspersed with dark clots. This softened layer, formed by the inflamed mucous membrane, is easily displaced by the scalpel, readily elevated or torn by gentle traction. There is present an intense congestion throughout the organ, between the muscular fibres, but this is most pronounced on the deep surface of the mucous membrane. On a section of the organ, if made with a very sharp knife, it is difficult to distinguish muscle from mucous membrane, the two having a similar appearance. However, the mucous membrane is easily scraped off with the curette which cannot penetrate the muscular layer unless it is much softened by inflammation, which is very unusual.

Hardened in alcohol, to fix the different elements, and cut in microscopic section, it is easily seen that the mucous layer is abnormally thick. When stained by picro-carmine this thickening is very plain to the naked eye. The mucous membrane then has a slightly-yellow tinge, which distinguishes it from the redder muscular tissue. It is, moreover, more transparent, especially in its deeper portions, where the microscope reveals the presence of glands. To appreciate these details by the naked eye it is enough to examine a section stained by picro-carmine, holding it against the light; the mucous membrane is seen to be 2 to 5 mm., even 1 cm. thick at times, whereas its usual thickness is but 1 mm. Its surface, instead of being smooth, is fungous, presenting alternate projections and depressions of a flabby appearance. These fungosities have received the name of villi, vegetations, etc., and the disease has been therefore termed villous, fungous, granulating, or vegetating metritis. These vegetations are at times very large, of a round and elongated form, and may become veritable polypi, sessile or pedicled. In other cases there are small cysts, of the size of a pin's head, resembling the ovules of Naboth, so common in the cervix and about the os externum, and having the same glandular origin; but they differ from these in the quality of the fluid contained. It is more thin and serous, less consistent and colloid, than the contents of the Nabothian ovules of the cervix.

These small cysts of the body of the uterus are seen more often in aged patients than in the young.

"Such is the macroscopic appearance of the uterine mucous membrane after chronic inflammation." [6]

In the histology of the subject there are three distinct types, often clearly presented in different subjects or at times combined in one. In this description I follow Wyder's recent work.[15]

Chronic Interstitial Endometritis.—The interglandular tissue which we have seen gorged with cells in the acute form so that it

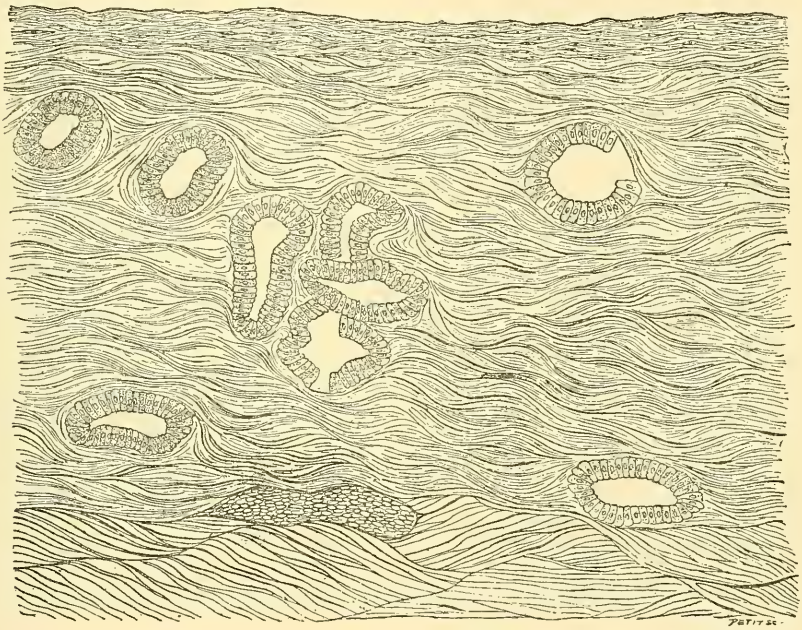


FIG. 98.—INTERSTITIAL ENDOMETRITIS WITH PARTIAL ATROPHY OF THE GLANDS (WYDER).

resembles granulation tissue, is transformed into true cicatricial tissue in which the number of cellular elements steadily increases. The glands undergo the opposite alteration, being strangled in places and transformed into cysts, or so compressed in their whole extent that they atrophy, and thus we may have a few glands scattered through the connective tissue (Fig. 98), altered into cysts in places (Fig. 99, *A*) or totally destroyed (Fig. 99, *B*).

In cases where the atrophy is very marked the muscular layer is covered by only a very thin layer of sclerosed connective tissue and this in turn by epithelium. Under the surface still covered by pavement epithelium (Fig. 98), one sees the mucous membrane traversed

by these fibrous layers which frequently interlace to form a meshwork, generally filled with a homogeneous substance, though the deeper portion of the tissue may be full of round cells packed close together. Nearer the surface the interglandular tissue has a more regular arrangement, being composed of a series of layers of cells and their parallel prolongations. The section may contain only very few glands.

At many points (Fig. 99) there are cystic cavities, lined with

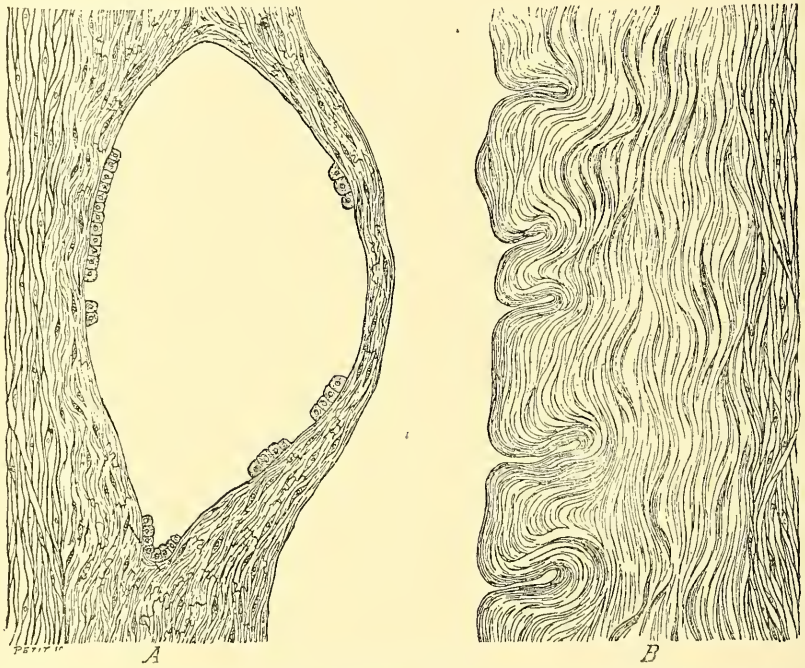


FIG. 99.—INTERSTITIAL ENDOMETRITIS WITH COMPLETE ATROPHY OF THE GLANDS (WYDER). *A*, Cystic formation, last trace of glands; *B*, all vestige of gland tissue disappeared.

cuboidal epithelium and surrounded by bands of connective tissue with fusiform cells. At places there are evidently no glands present, and the mucous membrane is represented by a homogeneous connective tissue which possesses no cells and is arranged in many bundles, the whole being clearly marked off by a sharp line from the muscular tissue. Near the surface this formation is smooth in places and at others arranged in large flat villous projections. There are present, therefore, all the signs of advanced connective-tissue sclerosis.

Chronic Glandular Metritis.—Ruge, and after him Wyder, recognized two forms of glandular endometritis, the hypertrophic and

the hyperplastic. In the first, the epithelial proliferation takes place without multiplication of the glands themselves. Instead of being a series of straight tubes, the glands are then of irregular form, frequently twisted and arranged spirally. In the hyperplastic form there is an increase in the number of the glands. Cornil[16] has discovered karyokinetic figures in the epithelium lining the glands (Fig. 102) in such cases. He is of opinion that this may be normally present after menstruation, as it is a feature of physiological repair in gland cells.

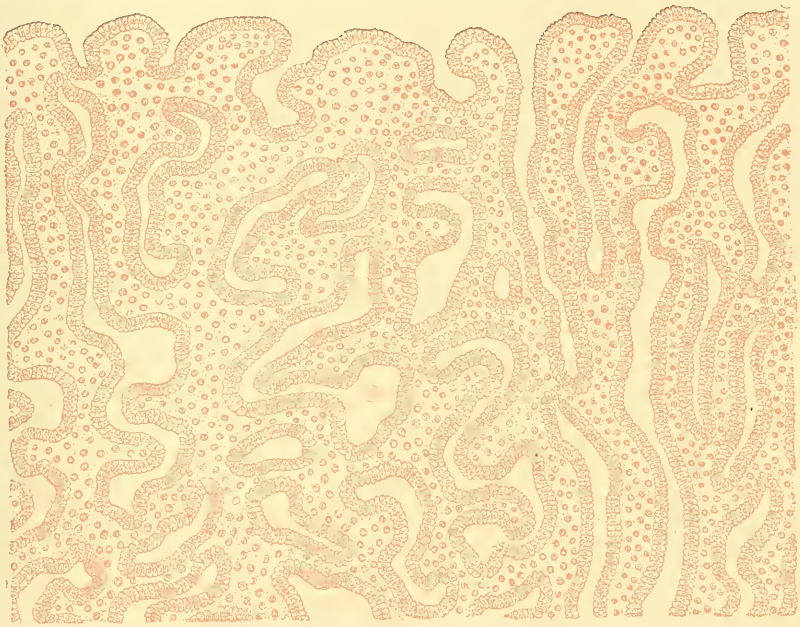


FIG. 100.—GLANDULAR ENDOMETRITIS OF THE UTERINE BODY (WYDER). Slightly enlarged.

Figure 100 presents a form of combined hypertrophy and hyperplasia which is more common than is usually supposed. The glandular tissue is absolutely normal in structure, but the glands themselves are much distorted and have lateral prolongations.

Chronic Polypoid Endometritis.—This form is marked by an enormous development of the mucous membrane, which has a fungous appearance and may be bristling with small and soft polypi. Récamier[17] was the first to give a good description of the macroscopic appearance in this form, and Olshausen has lately studied the subject anew. It is a mixture, histologically, of interstitial and glandular changes with marked cystic degeneration. On the surface the naked eye discovers small vesicles of 1 mm. diameter, transparent and a little

elevated; and these under the microscope (Fig. 101) are plainly degenerated glands lined with cuboidal epithelium. They are separated by bands of connective tissue; in the superficial layers the glands are

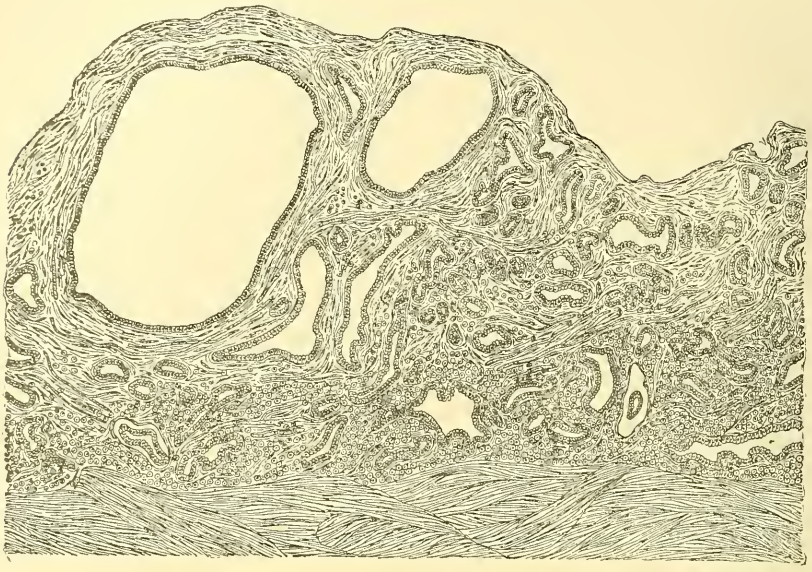


Fig. 101.—Glandular Endometritis, Polypoid Form (Wyder).

widely dilated, and more deeply they appear normal but are bent aside, parallel or oblique to the muscular fibres.

The glandular culs-de-sac pass beyond their usual limit in the depth of the mucous membrane and sink in between the subjacent

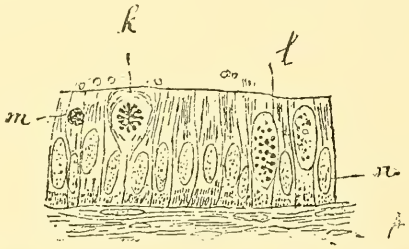


Fig. 102.—Epithelial Investment of a Gland from the Body of the Uterus (Cornil). × 350. Reichert's apochromat. with 00.4. *l*, Nucleus with enlarging granules and filaments of nuclein; *k*, nucleus showing the beginning karyokinesis, with "star" arrangement of nuclein; *m*, small, round wandering cell between the cylindrical cells.

muscular fibres according to Cornil (Fig. 103). This is a remarkable instance of what the older anatomists called "glandular heterotopy" occurring with a simple inflammation having no tendency to become malignant. In this invasion of the muscular tissue a certain amount

of their investing connective tissue accompanies the glands. The interglandular structure is very rich in vessels.

At the points which correspond to glandular dilatations, there are

FIG. 103.—GLANDULAR ENDOMETRITIS (CORNIL). × 40. Section showing the deep penetration of the gland. *a*, Surface of mucous membrane, epithelium partly removed; *b*, gland opening on the surface; *g*, glandular cul-de-sac deeply placed; *t*, connective tissue, new formed. with many lymph cells; *h*, *h*, glands divided lengthwise, twisted, and dilated in places; *m*, muscular bundles between which the termination of the glands are seen.

inclosed numbers of spindle-shaped cells, whose prolongations give the part a striated appearance, or, at other times, the tissue has very few cellular elements; this latter arrangement is especially noticed

about the blood-vessels. Lying deeply about the intact glands among the cysts there is found a homogeneous substance, replacing the proper interglandular tissue, which is full of round cells pressed closely together (Fig. 101). De Sinéty[18] has given an excellent description of the lesions of endometritis, although a post-mortem examination was made on but one case. He specially studied the vegetations and excrescences which are to be observed upon the mucous membrane, and which he removed for the purpose by a Récamier's curette; but he laid less emphasis upon alterations in the membrane itself. He describes three kinds of vegetation: the glandular, formed by enlarged and distorted glands, with thickening of the connective tissue; the embryonal, formed of embryonic tissue and a few dilated vessels; and the vascular, composed of vessels often widely dilated.

Certain authors discuss a diphtheritic metritis, which it were better to call gangrenous, since the false membrane is merely the product of a partial mortification. This is a simple nosological error which has crept into the group, so well-defined clinically, of inflammations of the uterus; whereas it is but a simple accident which may happen in the uterus or elsewhere, in certain peculiar conditions either general or local. Thus, diphtheritic metritis has been seen to follow tamponade with perchloride of iron,[19] and to occur after enucleation of a fibroma, or in the course of a septicæmia in an old woman who had a phlegmon upon the lower extremity.[20] Cornil has also observed certain details of high interest where the only change visible is extreme enlargement, and the glands in longitudinal or cross section present a single flat layer of cylindrical cells, usually on their internal aspect. Where there are many layers superimposed, the details are difficult to grasp, but sections sufficiently thin, if well examined, disclose only a single series of cells. The vibratile cilia which are found upon normal glandular epithelium are in great part preserved, and this retention of cilia in a gland so modified by chronic inflammation is a remarkable fact. At the same time, it is not always easy to find these cilia; it is necessary to use for that purpose excellent objectives and tissue absolutely fresh. To demonstrate them the material must be taken as it comes from the surgeon's hands at the operation and placed directly in some hardening fluid, preferably 90% alcohol. In preparations even of irreproachable freshness the cilia may seem to have disappeared; then there is seen upon the surface of the cell a delicate layer of mucus, sometimes clear and homogeneous, at others as if formed of little spheroid bodies, or somewhat striated, composed

of an agglomeration of the cilia. The cells which fill the alveoli, often completely, are identical with those found normally in the uterine glands, cylindrical or modified, ovoid or even mucous.

The only difference presented by portions of tissue scraped off with the curette and entire sections of the uterus, is found in the difficulty of recognizing the relations of the first; and therefore it is better to study sections made perpendicularly to the surface in material provided by hysterectomy.

Finally, there is a histological variety of endometritis which does not deserve the dignity of being placed in a separate class, and yet should be mentioned, and that is post-abortum endometritis. According to Schröder[21] it is almost always an interstitial form of metri-

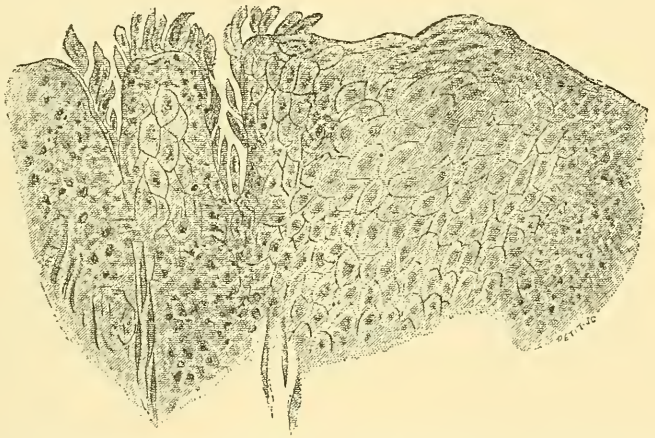


Fig. 104.—Endometritis Post Abortum, showing Islands of Decidua about which is an Active Proliferation of Cells.

tis which occurs after abortion, the glands taking part only very late in the disease. But the feature which distinguishes such metritis anatomically is the persistence of the decidua (vera or serotina) which undergoes a partial retrograde metamorphosis; if this persistence is partial, we find little islands of decidua, more or less prominent, about which there is a very active proliferation of small cells (Fig. 104). This inflammatory modification of the mucous membrane, adds Schröder, differs essentially from retention of the placenta, which is often described under the inappropriate name of endometritis post abortum, and which is only a hemorrhage post abortum due to incomplete contraction of the uterus and its vessels.

Lesions of the Cervix.—Anatomically it is incorrect to speak of metritis of the body as distinct from metritis of the cervix, for these

two portions of the uterus are never completely independent; most frequently the lesions are synchronous and undergo a parallel evolution. However, there is often a more decided localization of the disease in one or the other of these different parts; and as the cervix is the more exposed to traumatism, cervical metritis predominates. If the mucous membrane of the cervix is thoroughly diseased, the process is carried step by step into the fibrous and muscular portions, and thus a veritable parenchymatous metritis occurs with every inflam-

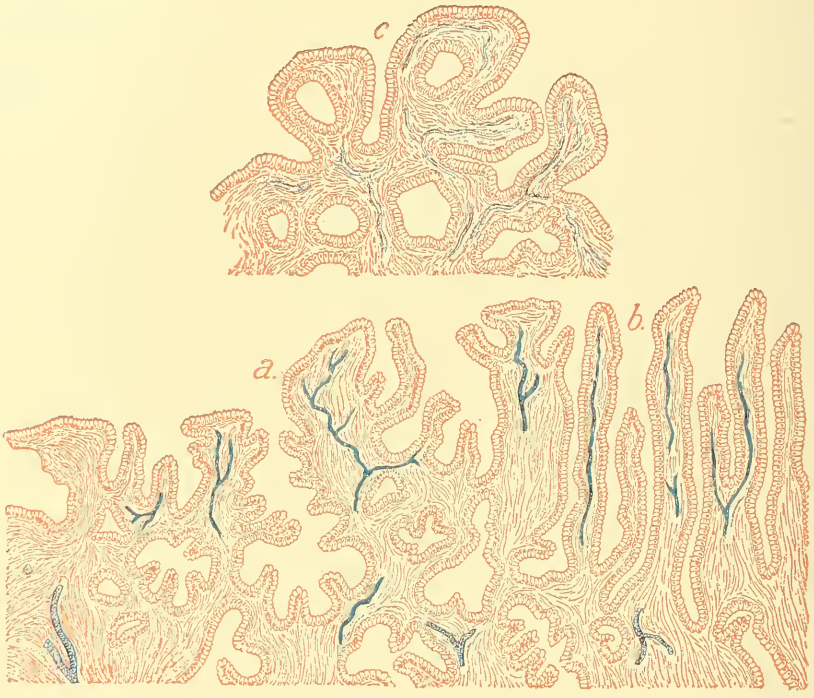


FIG. 105.—*a*, *b*, Simple papillary erosion; *c*, follicular. Slightly enlarged.

mation of the cervix if of long duration. Cornil expressly describes a parenchymatous metritis which may be partial. For example, the lesions are at times restricted to the cervix in the ectropion of the part caused both by thickening of the mucous membrane, turned outward into the vagina, and by thickening of the connective tissue beneath the mucous membrane and between the muscular fibres. In this connective tissue lesions of recent inflammation can often be demonstrated, by thickness of the trabeculæ and of the interposed flat cells.[22]

The neck of the uterus may present special and very diverse lesions

in metritis; there may be lacerations, ectropion, hypertrophy, congestion, varix, granulations, folliculitis, erosions, ulcerations, cysts, and ovules of Naboth, etc., etc. When this part of the uterus is accessible

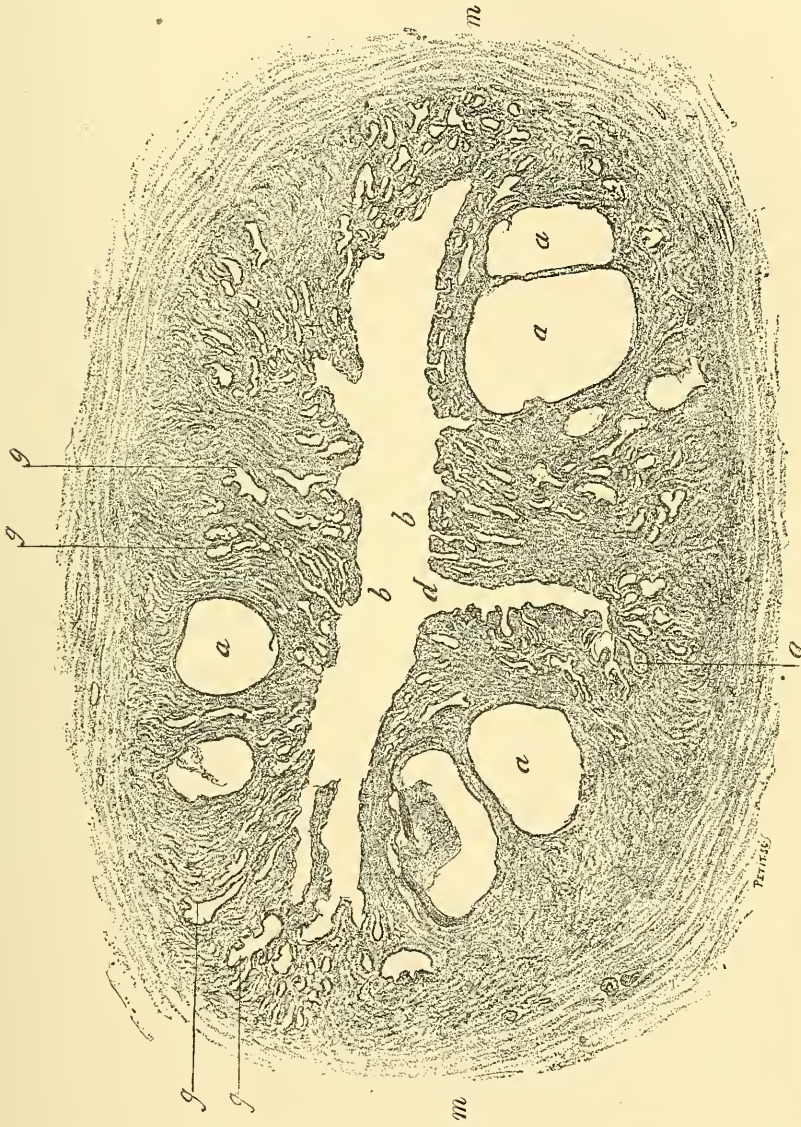


FIG. 106.—TRANSVERSE SECTION THROUGH THE UPPER PART OF THE CERVIX, SHOWING THE ENTIRE MUCOUS MEMBRANE (CORNIL). × 12 diam. The central cavity is the cervical canal. *b*, *b*, Internal surface of mucous membrane, presenting small folds, superficial glandular depressions, and large incisions of the arbor vitæ (*d*); *g*, *g*, deep glands; *a*, *a*, ovules of Naboth; *m*, *m*, muscular tissue of the uterine wall.

to the view, the macroscopic description should enter into the clinical demonstration; but it is necessary also to make the exact nature of the disease clear by the resources of histology.

Ovules of Naboth, Granulations, Folliculitis.—The Nabothian

glands, so called, are small cysts; granulations and folliculitis are small ulcerations (I will explain the value of the word farther on), scattered over the surface of the uterine neck. The one or the other of these resemble an eruption, and authors have been led to identify them with those of the external integument, erythema, eczema, herpes, acne, pemphigus,[23] etc., but the parallel is purely arbitrary, built upon theoretical views and lacking all serious foundation.

Erosions, Ulcerations.—The cervix may present, near the external os, a red and rough aspect without protuberances or depressions; this is erosion, properly so termed. It may be observed in acute vaginitis

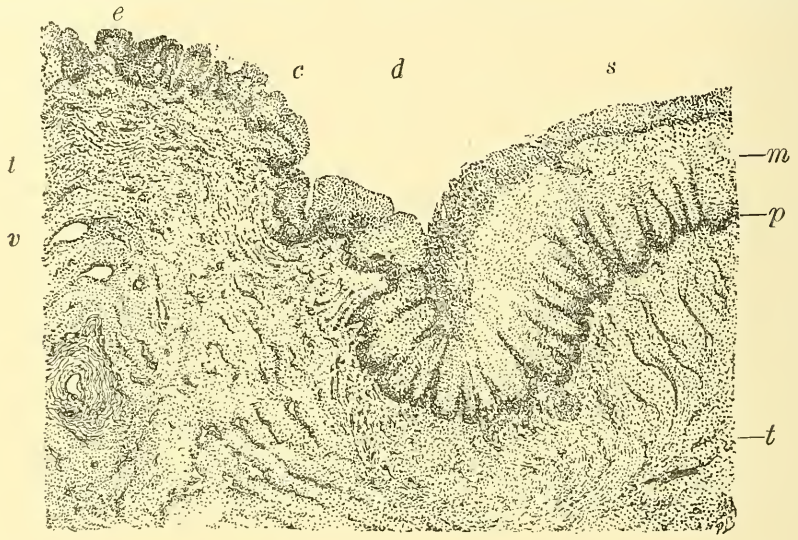


FIG. 107.—SECTION OF THE MUCOUS MEMBRANE OF THE VAGINAL PORTION IN A CASE OF CHRONIC INFLAMMATION (CORNIL). × 40 diam. *e*, Papillæ covered with a single layer of cylindrical epithelium; *c*, epithelium begins to be squamous; *d*, thickening of the squamous epithelium; *s*, superficial corneous layer; *m*, mucous membrane much thickened; *p*, papillæ; *t*, *t*, connective tissue; *v*, vessels.

with abundant secretion, or after contact with a foreign body (pessaries); under the microscope it is seen that there is a simple substitution of flat normal vaginal epithelium for the proper cylindrical. Fischel[24] has shown that there is often, in the infant at birth, a pseudo-erosion of the external os, the epithelium being then cylindrical over a certain zone externally. Later on, this epithelium is invested by stratified pavement cells; but when these desquamate, the original appearance is restored. Should there thus be a congenital predisposition to erosions it would be a curious fact. The observations of Klotz[25] seem to favor this view. According to him there are patients who suffer from erosion or ulceration under the influence of the

lightest inflammation, while others, though there be a severe cervical catarrh, never present such changes.

This author, moreover, insists on the anatomical differences of the individual as regards the adult and the virginal conditions of the cervix and the line of demarcation between the two kinds of epithelium. It would seem, then, that certain women are especially exposed, by a congenital idiosyncrasy, to cervical metritis.

Ulceration [erosion] is a term applied to still another kind of appearance: namely, where the entire circumference of the os, or only a part of it, seems to be depressed over a circumscribed area, presenting a circular edge and a smooth, red surface or one covered with villi. Gynæcologists have always regarded this condition as an actual

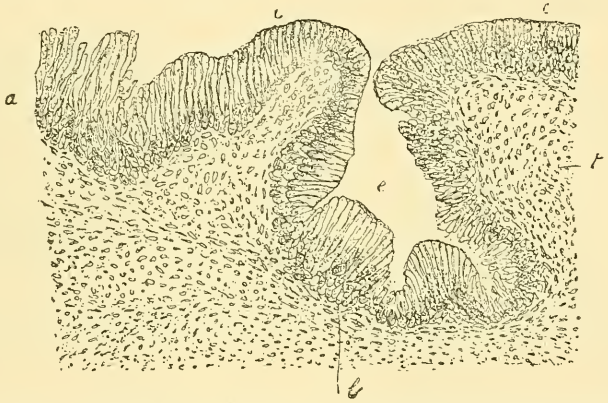
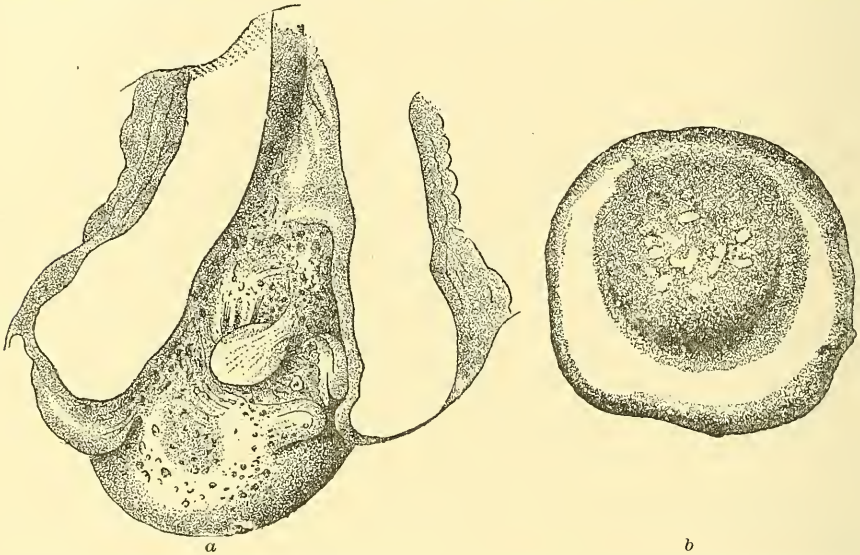


FIG. 108.—A PORTION OF THE MUCOUS MEMBRANE OF THE PREVIOUS FIGURE MORE HIGHLY MAGNIFIED (CORNIL). × 200 diam. *a*, Thickness of the superficial epithelial layer, formed of cylindrical cells much elongated; *e*, interpapillary depression; *t*, connective tissue.

loss of substance with destruction of the tissue, giving it the name of ulceration of the cervix, and some of them singularly magnify its importance. Lisfranc made this the capital symptom of his "uterine engorgement;" for him, it was the principal disease. Then followed a reaction, and Gosselin [26] had the courage—great for the period when he formulated the opinion—to assert that ulceration was not at all a disease, but merely the symptom of the uterine catarrh which Mélier's [27] work had made known to the profession. It is not as an inflammatory lesion, he declared, which reacts upon the system (Récamier's and Lisfranc's opinion), that ulceration is serious in its effects, but solely by the enfeebling drain of the discharge.

Tyler Smith,[28] and more recently Roser,[29] see in this lesion only a kind of hernia of the mucous membrane within the cervix, which is

comparable, according to Roser, with the similar condition observed in the lids during conjunctivitis. This author distinguishes a traumatic or cicatricial ectropion, due to laceration of the cervix, and an inflammatory, due to hernia of the mucous membrane. Assuredly a certain portion of the intra-cervical mucous membrane does make such a descent when it is swollen so that it passes out of the external os and appears upon the external surface of the part. It would thus form the greater portion of the exposed ulcerated surface in deep laceration. But in the majority of cases the external os is closed and does not allow more than a very thin edge of the internal mucous



a *b*

FIG. 109.—FOLLICULAR HYPERTROPHY OF THE CERVIX. *a*, Anterior lip, internal surface displayed by an incision; *b*, same, anterior lip, front view.

membrane to protrude, and when the ulceration has invaded a large part of the convexity of the cervix we absolutely must recognize that the ulceration has taken place *in situ*, upon that particular surface.

What is the exact nature of the alteration? Does the ancient notion of ulceration correspond exactly to an anatomical reality or only to an appearance? The authoritative work of Ruge and Veit, verified in France by De Sinéty, clears up this question. These authors affirm that there is no destruction of tissue, but a new formation; that while the cylindrical epithelium replaces, at the level of the external ulcerated surface, the pavement epithelium, it is the product of the adjacent glands, and the interglandular substance between the depressions assumes the appearance of stakes in a palisade, whence the papillary aspect of the surface. So that when a bilateral lacera-

tion permits, by this new glandular formation, a large display externally, the mucosa projects like a lining of crimson velvet in a sleeve. It is certain that laceration forms ulceration, but it is exaggeration to say, with Bouilly,[30] that there is no true ulceration without laceration due to child-birth. At other times the glands become cystic and form little projections on the bottom of the ulcerated [eroded] surface, which thus has the so-called follicular appearance (more evident in section than to direct inspection[31]) (Fig. 105, *c*). These cysts may form a semi-detached mass on the surface of the part, as mucous polypi (Fig. 110). They are small, of a red color, semi-trans-

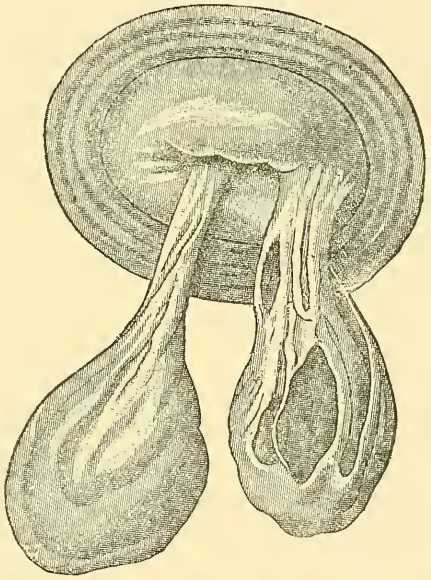


FIG. 110.—MUCOUS POLYPI FROM THE INTERIOR OF THE CERVIX AND UPON THE SURFACE, FROM FOLLICULAR HYPERTROPHY

parent or purplish, hanging by pedicles more or less free in the cavity, and projecting from the external os; in general resembling the mucous polypi of the nose, only far more vascular. (It is a mistake to describe mucous polypi of the uterus in a separate chapter, since pathologically, clinically, and therapeutically, they belong to hemorrhagic metritis.[32]) When this cystic transformation of the glands takes place throughout the cervix, it can produce, by penetrating and dilating its substance, an elongation by follicular hypertrophy (Fig. 109, *a*). Finally, the glandular vegetation and the cystic formation may produce within the cavity of a partly-opened cervix small vesicular projections which I compare to an almond (Fig. 109, *b*). The

theory of Ruge and Veit, true in most of these cases, is not, however, so absolute as its authors have declared. Fischel has objected to their exclusiveness and shown that there is at times an actual loss of substance, an ulceration in the proper sense of the word.

The epithelium in such cases is desquamated, and the mucous membrane is renewed by inflammatory granulations which start from the papillæ. Döderlein[33] has verified the reality of these two processes, that of pseudo-ulceration (Ruge and Veit), and that of the real form (Fischel).

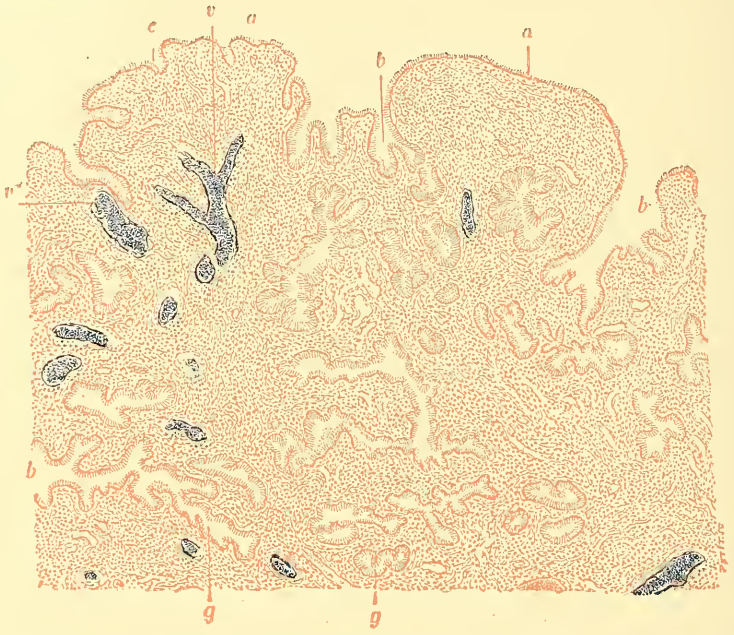


FIG. 111.—SECTION OF A GLANDULAR UTERINE POLYPUS (CORNIL). × 60 diam. *a*, *a*, Superficial nodules covered with cylindrical epithelium; *b*, mouth of glands opening into depression between; *g*, deeper portions of the same glands; *v*, *v*, blood-vessels.

Laceration of the cervix is an accident of common occurrence after parturition. It has been observed after abortion at the second month, when the elasticity of the fœtus would seem to make it unlikely on *a-priori* grounds; but that the cervix should be lacerated, it is enough that it should be insufficiently softened and dilated. It is almost always at the first delivery, according to Mundé's statistics, that cervical tears occur; though it is possible that both cervix and perineum, left intact by former child-births, should ultimately tear. There may not be the least notch in the cervix of a woman who has had children, and yet a considerable laceration may occur.

The pathological importance of cervical laceration has been brought into relief, and certainly exaggerated, by Emmet, who goes so far as to say: "The half of all uterine affections in women who have had children depend upon laceration of the cervix."

Pallen estimates the proportionate frequency of the accident as 40 per 100; while according to Goodell it is 1 in 6. Mundé, in 2,500 women which had been delivered, found 612 lacerations (25%), but only 280 (50%) were sufficiently deep to have any pathological importance; the others cicatrized or gave rise to but little complaint. The degrees and varieties of laceration are very variable; we can distinguish unilateral, bilateral, anterior, posterior, and stellate lacerations. The bilateral form is the most frequent; then comes the unilateral, then the stellate, the multiple, the posterior, and, finally, at the end of the series, the anterior. The unilateral has been most often observed on the left side; due without doubt to the frequence of the left anterior occipito-iliac presentation, the tear being made by the occiput. When the laceration is deep and partly healed over, there is a feeling of a smooth line along the cervix, sloping toward its surface; sometimes, in the vaginal cul-de-sac, at the base of the broad ligament, there is felt a small hard nodule, probably due to the same traumatism.

In the stellate form the clefts are usually less deep. Finally, one obtains the impression of a laceration in some cases in which I believe nothing of the kind has occurred; I mean those cases where the cervix is gaping and the finger finds no rent whatever in its circumference. Defenders of the pathogenic influence of lacerations have not been wanting who have seen in such cases a tear in the internal mucous coat, an endotrachelian laceration; which has produced a subinvolution of the part and consequent patency of the cervical canal. According to Mundé this variety should be considered as a subinvolution of the cervix with paralysis of its muscular fibres. For ease of description it has been proposed to divide lacerations according to their depth in three degrees; the first, but slightly cleaving the cervix; the second, dividing it through most of its length; and the third, which goes down to the vaginal cul-de-sac or even beyond (see Plate). It is possible for the laceration to be free from any accompanying ulceration, and for its whole surface to be covered with squamous epithelium like the rest of the cervix. This cicatrizing of the torn portion without reunion of the lips is particularly observed after surgical division of the cervix followed by vigorous

EXPLANATION OF PLATES III. AND IV.

FIG. 1.—Catarrhal Erosion of Nulliparous Cervix.

FIG. 2.—Cystic Erosion of Parous Cervix with Slight Fissure.

FIG. 3.—Deep Stellate Laceration without Eversion.

FIG. 4.—Stellate Laceration with Eversion and Cystic Hyperplasia.

FIG. 5.—Slight Laceration with Cystic Hyperplasia and Eversion of Anterior Lip.

FIG. 6.—Laceration of Muscular Tissue of Cervix not Involving External Os, but Producing a Relaxed, Gaping Condition of that Orifice.

FIG. 7.—Deep Unilateral Laceration with Eversion.

FIG. 8.—Slight Bilateral Laceration with Eversion.

FIG. 9.—Moderate Bilateral Laceration with Eversion.

FIG. 10.—Very deep Bilateral Laceration with Eversion.

FIG. 11.—Deep Bilateral Laceration with Eversion, nearly Cicatrized, but with both Upper Corners Showing Fresh Breaking Down of Cicatrix (Ulceration).

FIG. 12.—Cystic and Papillary Hyperplasia Simulating Epithelioma.

All the figures are shown as they appear in the left semi-prone position through Sims' speculum. (From paper by Mundé in *Am. Jour. Obst., etc.*, Vol. XII., 1879, p. 134.)

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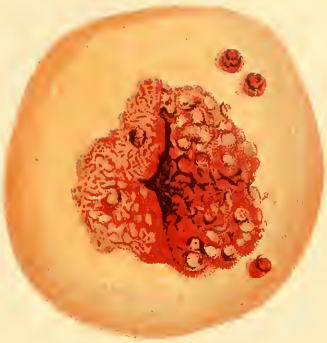

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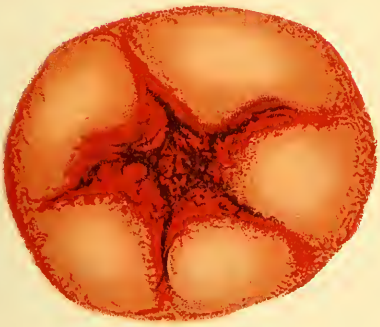

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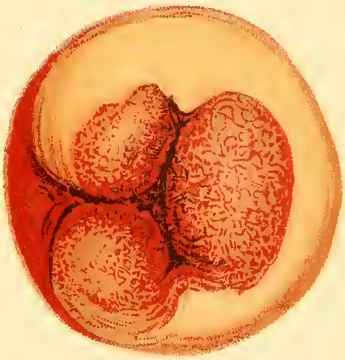

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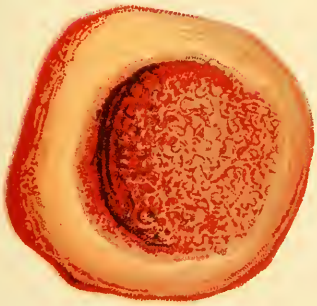

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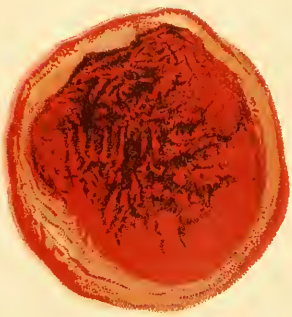

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CERVICAL LACERATIONS.

LINDNER, EDDY & CLAUSS, LITH. N. Y.

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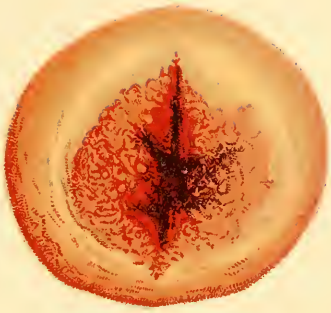

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CERVICAL LACERATIONS.

LINDNER, EDDY & CLAUSS, LITH. N. Y.

antisepsis. When it occurs after parturition, we can, therefore, conclude that the wound has wholly escaped infection. In the opposite case ulceration is produced; and then, the deeper the laceration and the more the lips are everted, the greater is the ectropion. This exposes the mucous membrane to all causes of vaginal irritation, friction, secretions, contact of air, etc., and is doubtless an efficient cause of the morbid processes styled ulceration. The cystic and papilliform changes may then be so far developed and so largely displayed that the everted lips have the appearance of a fungus of malignant character.

At the same time there are important histological alterations in the torn cervix. In the first place the work of cicatrization itself, and its consequent contraction, may have troublesome results; it compresses the glands, hastening their cystic degeneration and the hypertrophy of the tissue (cystic hyperplasia). This dense cicatricial tissue, by compressing the nerve terminations, can give rise to various nerve disorders, according to Emmet and his disciples.

It is especially the pressure excited by the superior angle of the laceration, according to this gynæcologist (who has so magnified the importance of this little accident)—it is in the pressure in the superior angle, which he calls "the cicatricial plug," that the trouble has its root; and he sees a frequent cause of nervous disease in this, even in cases where but little complaint is made of the cervical deformity. Doléris [34] follows Emmet, insists upon the cicatricial plug, and attributes part of its formation to a parametritis following infection of the tear.

Another early change in the cervix is the eversion of its lips, caused by traction of the vaginal insertion upon the divided cervix; this may reach extreme ectropion of the mucous membrane, which becomes more marked as the disease advances. Finally a third result of laceration may be arrest of post-partum involution, or passive congestion, catarrh, etc.

Pathogeny.—The majority of classic authors describe the different forms of metritis, one after the other, in complete form, and the study of causes is found distributed among many sections, as if each type differed in all parts. It seems to me that there is no interest in following this tradition. While I have presented the anatomical and pathological studies in one paragraph, I have given in one section all the causes, and so avoid useless repetitions.

From the point of view of pathogeny one may say that all inflam-

mations of the uterus are due to microbes; that is, of infectious origin.[35] This has now been directly demonstrated, so that there remains no more doubt on the subject. This opinion now generalized was first asserted by Schroeder.[36] This is how that eminent gynæcologist expressed himself many years ago: "Modern notions demand that we ascribe a very special importance to the penetration of noxious agents from the exterior into the uterine cavity. All that we certainly know in this respect is that gonorrhœal infections may cause acute or chronic endometritis. For my part I consider that this infection plays a considerable rôle in the etiology of metritis; for one finds at the same time that there is vaginitis and a cervical catarrh of recent or old date. However, in most cases of endometritis, of a nature plainly gonorrhœal, the vagina may be entirely normal, due sometimes to the fact that it has not been infected or that the disease has been present and, while leaving the vagina, has persisted in the uterus. Endometritis which follows parturition is, in most cases, due to a puerperal infection limited entirely to the mucous membrane and consequently unable to cause a general infection. In the same manner we can explain chronic metritis, which we so frequently find in nullipara, who have never had gonorrhœa, and in young women still virgin. Phlogogenic agents may, in the same condition, penetrate the uterine cavity, and I have no doubt that this penetration may sometimes be the result of habits of masturbation."

The most recent researches confirm this presumption, and this explains without doubt the gonorrhœal origin. Steinschneider,[37] in his interesting studies on the seat of gonorrhœal infection in females, demonstrated long ago that after the gonococcus had disappeared from the urethra it could still be found in the cervix or body of the uterus, as the mucous membrane there is better fitted for its culture than that of the vagina because of the unfavorable circumstances dependent upon the pavement of squamous epithelium of the latter, and the acidity of its secretion, together with the coexistence of the numerous bacteria which dwell normally within the cavity.

The same direct demonstration is not so easily obtained for the micro-organisms of post-puerperal endometritis.

Goenner, of Basle, has found in cases of puerperal fever streptococci which are very easily cultivated. Döderlein[39] has recently collected the lochia of a parturient woman from within the uterus itself. These lochia were examined by the microscope, and by cultures on gelatin and agar-agar. The result was that following normal

labor, with a temperature not beyond 38° C. (98.4° F.), there were no germs; but, when there was fever, bacilli and cocci were found until the temperature fell, they being then eliminated by the very abundant secretion, especially when it was purulent. The results of the pathological labor, and also, without doubt, of the consecutive metritis, are thus due to the pathogenic influence of the Streptococcus pyogenes. Döderlein thought that these germs were carried from the vagina into the uterus by the exploratory finger or instrument.

Straus and Sanchez Toledo [40] have published confirmatory experiments, but their attempts to infect the uteri of rabbits with septic lochia have failed, because of the different form of placenta and the absence in these animals of a decidua.

Péraire [41] observed, and was able to cultivate, both bacteria and cocci found in the secretions of metritis; and the inoculation of rabbits with these produced both fever and vaginitis.

It is, then, well established that in septic metritis, or, better, in the infection of the uterine mucous membrane following labor or abortion, the cause of the accident is a proliferation of the pathogenic microbes, and the actual metritis which persists after the puerperal state is due to the persistence of these germs.

A much-discussed question is, What is the point of invasion of these microbes? Do they always come from the exterior, or may they come from within? Are they, in other words, a hetero-infection or an auto-infection? I will not enter into the long discussions recently provoked by this subject; [42] it is enough to give briefly the conclusions which seem to me to be trustworthy.

Hetero-infection, or infection by contact (Kaltenbach), or exogenous infection (Fehling), is by far the more frequent; it is indeed the rule. Leopold found an enormous diminution of the death-rate in his service after he had forbidden the examination of pregnant women; that is, in spite of all antiseptic precautions the exploratory finger may be the vehicle for germs. In a normal labor the vagina should be considered as aseptic (Bokelmann, Dührssen). There are no germs, as I have stated, in the lochia of a normal labor; they are not to be found in the upper portion of the vagina immediately after parturition according to Ott; [43] and he attributes this fact to the cleansing action of the waters and the friction of the fœtal body upon the vaginal walls. Thus, if everything is favorable, with no retention of fœtal débris, with no accumulation of clots from atony of the uterus, and with no premature rupture of the membranes preventing the

physiological cleansing of the genital canal, there is no chance whatever of infection. This is the explanation of the happy issue of so many labors where no precautions have been taken, for Nature, we are accustomed to say, has provided for her own asepsis. We must, therefore, beware of useless interference or manipulation in simple cases, and abstain from meddling with antiseptic injections which may be useless, and therefore dangerous.

There is nothing specific in a bacterial infection of the uterus. It is an error long since laid aside to think that each special infection corresponds to a special pathogenic element.[44] It is known perfectly to-day that but one and the same microbe, the Streptococcus pyogenes, causes all the septic lesions of parturition, and is also produced in erysipelas and furunculosis.[45]

Puerperal infection of the uterus, the starting-point of consecutive metritis, may then be the product of a pathogenic germ coming from various sources. It is demonstrated to-day, not only by clinical experience, but also by bacteriological observation, that the germs which cause surgical infections, boils, and erysipelas may infect the parturient woman, and be found then in her genital secretions. While I was interne at the hospital during Broca's service I had many opportunities to see small epidemics of erysipelas in the surgical wards following puerperal fever in the obstetrical wards near by. This mixed infection has been made the subject, during the last years, of very interesting works from the pathogenic point of view. Pfannenstiel studied a little epidemic in the Breslau Frauenklinic, following a general attack of tonsillar angina, and perfectly demonstrated their bacterial relationship.[46] The streptococcus of erysipelas (Str. erysipelatis, Fehleisen) and of suppuration (Str. pyogenes, Rosenbach) are closely related and seem to occur equally in puerperal infection.[47]

Winter's researches on this subject are very valuable, because of the ability of the author and the rich material at his disposal, thanks to the numerous hysterectomies and salpingotomies of the Berlin clinic. This fresh material removed many of the causes of error of former researches, and led him to the conclusion that in the genital canal of the female there is a zone rich in micro-organisms which I call "the dangerous zone." Not only do the vagina and the cervix contain germs in abundance, as Hausmann, Küstner, Lomer, and Bumm[48] have proved, but these germs are pathogenic in the majority of Winter's cases,[49] the species which prevail being staphylococci (pyogenes, aureus, albus, and citreus) and various kinds of strepto-

cocci. This is of the utmost importance, for it proves the possibility of self-infection. It would not be easy to understand why such infection does not occur more often, in every labor in fact, during the period of rapid multiplication of the germs, but that Winter has shown by his inoculations with cultures obtained at that time that the staphylococci have lost their virulence, being domesticated, as it were, in the genital passages. We have thus an example of spontaneous attenuation which is equally remarkable and fortunate. But it is quite probable that this virulence might be rapidly regained under favoring circumstances, *e. g.*, the presence of organic débris. Thus we can understand why abortions are so dangerous from bits of retained fœtal structure, the uterine infection advancing step by step. It is equally plain how great is the risk of making uterine exploration without previous cleansing of the genital canal; even though the finger and the sound may be rendered aseptic, they may still become the vehicles of infection, for they may transport germs from the cervix into the body of the uterus. It is at the level of the internal os that the dangerous zone is found.

Certain mechanical conditions may aid in producing uterine infection. Thus Schultze[50] thinks that in women with a patulous vulva, as is the case in many multipara even without perineal rupture, a slight leucorrhœal discharge may carry atmospheric germs; and in a similar way the menstrual discharge may act in women with a closed vulva. Hence the necessity, according to Schultze, of protecting the part by a pad which will filter the air.

Other germs than those usually found in the vagina or cervix may be carried by the sound into the uterine cavity. In large towns we live in the midst of bacteria. Eiselsberg[51] has found Staph. pyog. aureus in the wards of a hospital; Fürbringer[52] demonstrated them in matter scraped from the nails; Passet found them in dish-water, and the same author encountered Staphy. pygo. albus in some slightly damaged beef, etc. Biondi[53] found the same germ in normal saliva. These observations prove the many chances of infection, which would indeed be almost inevitable but for the vital force of living tissue which fights against it; whatever lessens this force, therefore, opens the door to infection.

Some of the most curious examples of such action is found in what Verneuil calls latent microbism, for we do not have to do with an extinguished danger, but with an infection which does not yet exist, depending for its development upon a transformation of its medium

from physiological to pathological conditions. Auto-infection, or, as Fehling styles it, endogenous infection, is thus reduced to a question of culture media, producing virulence in an organism before inactive. Thus Chauveau[54] restored the powers of charbon (anthrax) bacilli by cultivating them in rarefied air in blood-plasma and bouillon. If this faculty of increasing the noxious powers of germs residing in the female genitalia belongs to organic débris, may it not be called forth by other means? Could not general debility of all the tissues, which reduces cellular vitality, or traumatism, with its inhibitory action (Brown-Séquard), raise the barrier of phagocytism which keeps all germs out of the body or renders them inoffensive? Perhaps we may thus explain the effect of certain diseases, as eruptive fevers, and also of venereal excess.

Moreover, it has been shown that the presence of one germ aids the development of another species. Thus women with gonorrhœal metritis (Neisser's gonococcus) are easily infected with septic material more or less attenuated, as staphylo- and strepto-cocci or even tubercle bacilli. Such may be termed mixed infection. Thus the lesions of pneumonia prepare the lung for the invasion of the tubercle bacillus (Koch).

Etiology.—Passing now to the direct causes of metritis we find them associated with, 1st, menstruation; 2d, copulation; 3d, parturition; 4th, traumatism.

1. *Menstruation.*—The establishment of the catamenia may be the signal for metritis to manifest itself, because of the intense congestion of a peculiarly vulnerable organ. There is generally present in such a case some malformation of the uterus which induces venous stasis; incomplete development, congenital anteflexion, a conical cervix, stenosis of the os, exposure to cold, and masturbation may be some of these primary or secondary causes. To this virginal[55] metritis, there is, at the other pole of the woman's genital career, a corresponding metritis of the menopause, for at that time again there may be a predisposing active congestion.

Between these two extremes every menstrual period favors the development of metritis, and every extra fatigue or exposure to cold may bring it on if the uterus is malposed, if the cervix is contracted, or if there is a deep laceration from previous labor.

2. *Copulation.*—Excessive coitus, whether during menstruation or coincident with great[56] fatigue, may provoke uterine inflammation independently of all contamination; but far more often it is a gonor-

rhœal infection, more or less disregarded, which is so efficient a cause[57] of metritis and which plays this rôle in the case of newly-married women. Husbands who consider themselves cured and pay no attention to a trifling urethral discharge may thus infect the urethra, the vagina, the cervical and uterine cavities, and the tubes of the young wife.

Such a gonorrhœal infection may remain a long time latent within the cervix; then under the irritation of a rough examination, or after abortion or labor, the infection gains entrance to the body of the uterus. Noeggerath[58] asserts that in women with gonorrhœa abortion and labor are followed by metritis and perimetritis as often as 75%; substituting salpingitis for perimetritis, the statement is not exaggerated. It is doubtless to this cause, also, rather than to the traumatism of too frequent coitus, that we must refer the metritis of prostitutes. Abortions are frequent and unheeded among women who are beginning a debauched life, and later the inflammation of the uterus rises high enough to involve the tubes, obliterating them and causing sterility.

3. *Parturition.*—This is by far the most frequent cause. Normal labor, spontaneous and induced abortion, leave the uterus in a peculiar condition of hyperplasia and congestion which demand special hygienic conditions for their gradual removal; but these conditions are often neglected, from carelessness among the well to-do, from necessity among the laboring classes. It is not so very long ago that celebrated obstetricians considered fifteen to twenty days' rest sufficient (Cazeaux). Guérin justly opposed this fixed rule, advising that the patient should not be permitted to leave her bed till a week after the first menstrual period; for only by that time has the uterus regained its normal size.[56] Without such care we see a post-puerperal engorgement intervening, which is Chomel's "post-puerperal metritis" and Simpson's "arrested involution;" the chronic metritis, uterine infarction, chronic and painful metritis of other authors.

When parturition has been abnormal, by reason of difficult delivery, and when pieces of placental detritus have remained a long time in the uterine cavity, then the organ is specially liable to inflammation. At such a time there can be no doubt that we have a local infection, and if a rigorous antiseptic treatment is not at once begun, there is reason to fear that the disease may persist in chronic form. The same is true of abortion where, as is so frequently seen, small portions of the decidua graft themselves upon the mucous membrane and become centres of infection for it.

One condition in particular has recently been insisted upon as of great influence in establishing and prolonging metritis, and that is cervical laceration, as Emmet[59] styles it. This American gynæcologist was the first to recognize its importance (in 1869), though Bennet[60] had dimly foreseen it some time before. But in America there is a disposition to exaggerate the influence of this lesion.

It is customary to attribute many consequences to cervical laceration; as delay of the normal uterine involution after labor, then hyperplasia, sclerosis, and compression of the nerve filaments; ovarian congestion and inflammation; parametritis; extension of the sclerosis from the laceration to the rest of the cervix with compression of the nerves and glands and production of cysts locally and neuralgias and neuroses in general; ectropion and inflammation of the cervical mucous membrane following the traumatism to which it is exposed; tendency to retroversion and prolapse. Nor is this all; Mundé,[61] Olshausen,[62] Hegar and Kaltenbach[63] consider old lacerations a frequent cause of habitual abortion; Breisky[64] thinks that they predispose to carcinoma, affording a locus minoris resistentiæ. Emmet's ideas on the pathological influence of laceration have given rise to many long discussions, some of which are very recent. At the meeting of German naturalists held in Wiesbaden, September, 1887, Noeggerath[65] presented a long statistical paper which was intended to reduce the rôle of cervical laceration to nothing by demonstrating the following propositions:

1. Women with laceration of the cervix conceive more easily and abort less than others.
2. The position of the uterus is not influenced by laceration.
3. The cavity of the uterus is not elongated.
4. Erosion and ulceration are not more frequent.
5. Ectropion never results.
6. Alteration in the cervical tissues is not more frequent.
7. Laceration produces no change in the frequency or severity of uterine disease.

In the discussion which followed the reading of this memoir, Sänger, Ahlfeld, and Skutsch declared that Noeggerath had gone too far in his criticism; and not long afterward, Brooks Wells[66] published a carefully-written paper which refuted Noeggerath's position point by point. Wells also employed statistics, but he arrived at a directly opposite result, insisting especially upon the importance of laceration in the production of reflex neuroses.

It is difficult to give a categorical opinion amid assertions so contradictory and so authoritative. It seems to me that the rôle of laceration has been alternately too much exalted and belittled. It is false to suppose that no other cause for uterine malpositions exists, or to attribute all inflammations of the organ and its adnexa to laceration alone. At present it is generally agreed that uterine displacements may give rise to nervous phenomena, but they cannot be said to cause metritis, however much they predispose thereto. This then is the limit of the influence of laceration—it may cause morbid reflexes, and predispose to cervical catarrh and prolong it. But there are many cases of retroversion without symptoms, and as many of laceration without metritis; at the same time there are lacerations which extend to the cellular tissue of the cul-de-sac, and bilateral forms with marked ectropion, which have a pathological importance that cannot be neglected.

Traumatism.—Chronic contusions, produced by a pessary that is too large or badly placed, so that it exerts strong pressure upon the uterus, may give rise to acute symptoms of metritis which disappear as soon as the instrument is removed; and of all pessaries, those with an intra-uterine stem are the most dangerous, unless carefully watched by the surgeon.

Finally, any operation whatever within the genital canal may be the starting-point of metritis (with or without parametritis and perimetritis) if strict antisepsis has not been maintained. Such accidents, so frequent that gynæcologists were justly timorous, exist no longer in the practice of those who observe the rules—which might almost be called sacred—of modern surgery; for to-day even if inflammation do occur after operations within the uterine cavity, it may, to a certain point, be kept from becoming septic, and permanent results prevented.

Very hot or cold vaginal injections have been accused of causing metritis; for my part, I lay but little stress upon them as a cause: an injection may do harm if the tube is ill-fitting or if force enough be used to injure the cervix. In prolapse, for instance, the injection tube has been passed into the cervix and serious accidents have followed; but this has nothing to do with metritis.

Other Causes.—Ought we to regard the exanthemata as a cause of metritis, as certain authors have done[67]? It seems to me that new observations are needed upon this point. We cannot deny that the female genital tract may be more exposed to disease after a general

affection which has enfeebled the entire organism. Certain maladies (icterus) and some poisons (phosphorus) may produce an acute fatty degeneration of the uterus; but that is a lesion, not a disease, and it is a mistake to insist upon it in connection with metritis.

The influence of diathesis has been very much exaggerated. Martineau [68] has even classified metritis into constitutional and traumatic. According to him, constitutional metritis is partly protopathic and partly deuteropathic, arising from scrofula, arthritis, herpes, chlorosis, syphilis, or tuberculosis.

I consider it a misuse of language to describe a scrofulous or herpetic metritis, as if they possessed clear-cut boundaries. I willingly grant that general conditions and place involved play a great rôle, if not in the production, at least in the permanence of local inflammation, particularly of metritis; and that we must carefully examine the general state of a patient before attempting treatment. But this is all that I can concede to diathesis.

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CHAPTER VI.

SYMPTOMS, COURSE, AND DIAGNOSIS OF METRITIS.

After studying the diseases of the internal genital organs of the female, it is impossible not to be struck by the similarity of the rational signs obtained by questioning the patient. The symptom-complex differs but little whether the case is one of chronic metritis, catarrhal endometritis, fibroma, cancer, or salpingitis. Of course I do not go so far as to say that they are identical, for if the questions are sufficiently precise, sensible differences are found in the intensity of special symptoms. But although a certain part of the picture may be particularly clear—as the hemorrhage in fibroma, leucorrhœa in cancer, nervous troubles in displacements or disease of the adnexa—it is not the less true that the chief features are the same: different states of the same plate, often retouched.

By the term "uterine syndroma" I would express the common symptomatic basis which I have found—as Beau grouped in his asystolic syndroma all the phenomena of cardiac disease when the heart arrives at its period of fatigue, whether the lesion be mitral, tricuspid, or aortic. I think I have found the same interest in the clinical synthesis which I propose; for I believe that with this sketch it will be enough for the special case to fill in the necessary touches, so avoiding useless repetitions.

This study of the uterine syndroma naturally has its place here, as it so closely corresponds to the rational signs of metritis. The principal features of the uterine syndroma are:

Pain, leucorrhœa, dysmenorrhœa, metrorrhagia, symptoms from neighboring organs (bladder, rectum), symptoms from distant organs (digestive canal, nerves, etc.).

I will pass these successively in review.

The pain is spontaneous; its seat is in the smaller pelvic cavity, but its focus is not always at the same level as the uterus; it is not in the hypogastric region that the patient suffers the most, but frequently in the iliac fossa, especially the left near the ovary. To explain this fact it seems reasonable to admit the presence of a slight

catarrhal salpingitis with uterine inflammation. The tubes are simply prolongations of the uterus; anatomically and pathologically the two organs are the same. The term metritis should include almost always metro-salpingitis, with unequal distribution of the inflammation; that of the uterus predominating, that of the tube being not less real; as to the predominance of the left side, it is as difficult to explain as epididymitis on the same side.

Another focus of pain is found in the lumbar region.

This pain is increased by all fatigue, such as the jolting of a carriage; but such mechanical influences may not produce an immediate increase; the exacerbation may come on only after the lapse of some time. Riding in the horse-cars is usually well borne, but railroad travelling it is injurious because of the peculiar shaking endured. The pain is dull, persistent, giving a feeling of weight and fulness in the perineum and lower pelvis; seeming to the patient as if there were a foreign body there, tending to escape—that is, she feels her own uterus. The bent position in walking in acute cases is characteristic; instead of seating herself hurriedly, the patient does it with great care, helping herself with the support of a piece of furniture near by, like the arm of a sofa, lest she reawaken the slumbering pain. The distress is increased by pressure, especially in bimanual palpation; but one can assure himself that it is not so much the direct pressure upon the cervix which is painful, as the part is not sensitive (except in lumbo-abdominal neuralgia), but the transmitted shock to the uterus itself. Gosselin has long insisted upon this distinction.[1]

Leucorrhœa.—This is a constant symptom. It may be more or less masked by the blood or pus present in the discharges, but it is always present; singly or in combination.

Leucorrhœa (whites, etc.) is a phenomenon so important in gynæcology that some of the older authors[2] made it the principal disease of the uterus and grouped all the others about it. Even Courty makes leucorrhœa an entity, an idiopathic affection, in certain cases.[3]

Leucorrhœa is a morbid alteration and exaggeration of the physiological uterine and vaginal secretions. In a state of health these parts secrete in small quantity a mucous liquid which always contains a few leucocytes, due to the destruction of the local epithelium. As soon as this has become abundant and purulent, it is morbid and constitutes a leucorrhœa.

This may be from two sources—the uterus or the vagina.

Vaginal leucorrhœa may often be found alone; it may be a dis-

charge of very thin fluid of a milky appearance, which does not stain the linen much, or it may be charged with pus and be of a greenish-yellow color; its reaction is acid.

Leucorrhœa from the body of the uterus is of a somewhat viscid nature; that from the cervix is jelly-like and in the normal state is transparent, like the unboiled white of egg, staining the linen strongly; in disease it is of a greenish-yellow color. Its reaction is alkaline.

O. Küstner[4] has made precise researches upon the uterine secretion, both normal and diseased. He introduced glass tubes into the uterus and then carefully closed the external os with collodion and diachylon. In this way he examined six women who were free from uterine catarrh, and found that the secretion of the uterine neck and body had the characters I have indicated. Afterward he examined women with uterine catarrh, with or without purulence, and demonstrated that most often the inflammation was present in both cervix and body; and that isolated catarrh of the cervix was more frequent than isolated catarrh of the body of the organ. In all his cases Küstner, by the microscope, demonstrated the presence of micro-organisms in great quantity, having for the most part an oval form, and presenting four or five distinct types. The recent researches of Winter, as stated above, show that these germs are identical in form with pathogenic varieties.

The leucorrhœal secretion is seldom voided by steady flow, not that its production is not constant, but that it accumulates in the vagina and escapes a little at a time. In some cases there appear to be secretory crises, when a great quantity of fluid is discharged all at once after a strong pain; this suggests the intermitting discharge of a dropsical tube (hydrops tubæ profluens). But I have observed in many cases that this flow by jets may be present where there is no tubal collection; properly speaking, it is a phenomenon of reflex pathological hypersecretion.

Certain authors have sought for a method of diagnosis between leucorrhœa of the vagina and that from the uterus. Schultze[5] has proposed to introduce a tampon of cotton into the vagina and leave it in contact with the cervix during twenty-four hours; then, on removing it, one can judge from the quality of the absorbed fluid whether it is from the body or the cervix.

Leucorrhœa may depend simply on a general debilitated condition, as anæmia, chlorosis, etc. This symptomatic form is so frequent that

Marc d'Espine[6] has claimed to find it in two-thirds of all women. Many workwomen in Paris have a leucorrhœal discharge, and explain it by the fact that they are accustomed to drink *café-au-lait*, and there are physicians who are able to gravely accept this grotesque explanation. Perhaps it is true that because they are able to take no better nourishment, certain women have the whites.[7]

Metrorrhagia, Dysmenorrhœa.—Menstrual troubles may occur with uterine disease, but it must not be supposed that they are constant. Dysmenorrhœa, or painful menstruation, is often observed in metritis from the same mechanical obstacle to the flow which induces the inflammation (flexion, narrowness of the cervix, etc.). Amenorrhœa is chiefly due to anæmia; for though metritis which has lasted a long time may debilitate the patient, still its influence is indirect.

Metrorrhagia, on the contrary, is directly dependent on the uterine inflammation, and is most often seen when the mucous membrane of the body is affected in interstitial metritis (either primarily or following fibroma and carcinoma), the loss occurring during the regular periods or at other times. In the first case we speak of it as menorrhagia, in the second as metrorrhagia.

Most of the uterine diseases are an obstacle to conception; but the sterility is not absolute, for pregnancy may occur with cancer and fibroma, and the same is true of metritis. But abortion is frequent in these diseases.

Symptoms from Adjacent Organs and Reflexes.—Apart from pressure effects, which do not enter into this general description, or properly belong to metritis, there are always symptoms from adjacent organs in all affections of the uterus. Patients complain of pain in urination, frequent micturition, or it may be of vesical tenesmus. Every disease of the uterus affects the bladder more or less, and yet the patient may not call the attention of the physician to the vesical disturbance. When it is necessary to use a catheter, cystitis may follow if antiseptic precautions are not observed.

Since patients avoid going to the water-closet, on account of the efforts involved and consequent pressure on the uterus, they defecate as little as possible and become habitually constipated.

Uterine Dyspepsia.—There is no function upon which uterine disease reflects more constantly than on the digestive, and ignorance of this fact may cause grave errors of diagnosis. Such a dyspepsia is explained by reflex action from the nervous system; to understand it, the peculiar richness of the sympathetic innervation of the uterus

and stomach need only be recalled to mind. Dilatation of the stomach is very common in metritis of long duration, with all its train of symptoms so well described by Bouchard and his pupils.[8] The subject deserves renewed study, for dilatation from uterine cause has not as yet been thoroughly described; I have already collected a number of observations upon it. But to dyspepsia, or inactive digestion, the attention of gynæcologists has for a long time been directed, though their descriptions are but brief; Bennet and Courty have mentioned it without insisting upon it. More recently important memoirs have appeared upon the subject.[9] These patients suffer from loss of appetite, nausea, and a peculiar form of flatulence, which occurs as a chronic tympanites, so that the abdomen enlarges till the end of the disease, however much the patient may have lost flesh. This meteorism is very troublesome and interferes with abdominal palpation and bimanual exploration.

Respiratory Reflexes, Uterine Cough.—Patients with uterine disease very frequently have a dry cough, occurring singly or five at a time, even though there may be no trace of disease in the respiratory tract and the hysterical element can be eliminated. It is generally a small choking cough, but may be so metallic and sonorous that both the patient and her friends are alarmed. Aran[10] has described this briefly; one of my pupils has devoted to it a more complete study.[11] Its peculiarity is that there is no auscultatory symptom, and that it disappears with the uterine lesion—displacement, metritis, etc.

Symptoms Referable to the Central and Peripheral Nervous System.

Neuroses and Neuralgias of Genital Origin.—We can explain the pathogeny of these reflexes by the richness of the innervation of the genital organs, which are supplied from the great sympathetic through the hypogastric plexus, and from the cord through the internal pubic (Fig. 112). Neuralgia is very common. Intercostal neuralgia is so constant that Bassereau claimed that it was always connected with metritis. We find also facial neuralgia, and lumbo-abdominal with radiation of the pain along the cutaneous femoral branches, particularly down the left thigh.

Simpson and Scanzoni[12] have insisted upon sacral neuralgia, which they have made the subject of monographs under the name of coccygodynia. An attempt has been made to refer peripheral neu-

roses to the sensory nerves. Clifton S. Morse describes a form of asthenopia dependent upon uterine disease.[13]

Lastly I may mention cardiac palpitation, both reflex and due to anæmia.

I will not insist upon the general nervous troubles, which are of great diversity. The nervous symptoms cover all the forms of hysteria; not that we have a veritable hysteria, though it may rarely be present, but that "alterations of the nervous system, in women, almost

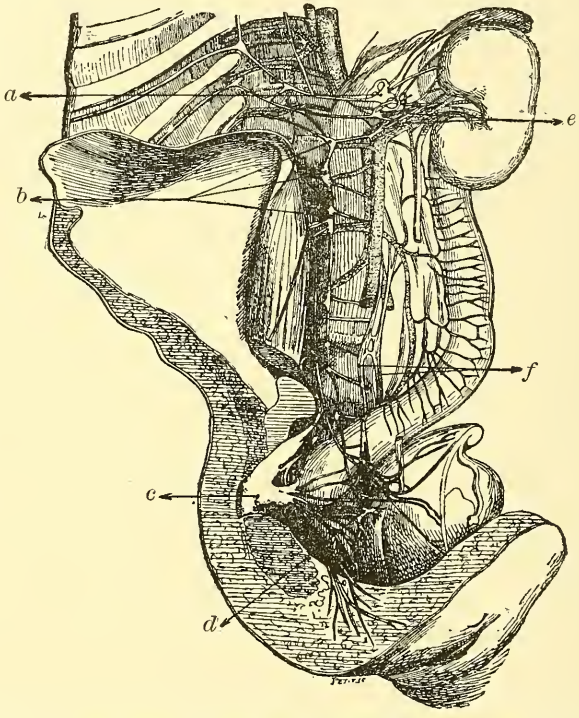

FIG. 112.—GENITAL NERVES OF THE INFANT. Right side. *a*, Right cœliac ganglion; *b*, first, second, and third lumbar ganglia; *c*, sacral ganglion; *d*, cervical ganglion; *e*, renal ganglia; *f*, hypogastric plexus.

always take this form, especially where the uterus is the point of departure" (Courty).

It is certain also that any genital disease in a woman predisposed to hysteria will produce a development of that neurosis; thus we can explain both the intensity of the symptoms caused by slight ailments, like Emmet's "cicatricial plug," and the marvellous success of certain operations. How can we defend the diagnosis of hysteria when we read observations like that of Mundé,[14] of an attack of sciatica or catalepsy produced simply by pressure upon the cicatrix of a lacera-

tion, all such attacks disappearing after operation? One might almost believe in a special pathology for the hysterical, and special chances of successful treatment, and expect unhoped-for results with means which remain useless where the nervous system is not hypersensitive.

There is another consequence of uterine disease which is often seen with metritis, displacement, etc., which may last through many years. This is a peculiar asthenia, an excessive depression of the nervous system which renders the patient incapable of all effort, although there is no loss of muscular strength or other deviation from health corresponding to this languor. This must certainly be attributed to morbid reflex action.[15]

Finally we shall see, in studying displacements of the uterus and diseases of the adnexa, that there are grave nervous troubles present at times, like chorea, epilepsy, etc., which depend directly upon them and which are curable at the same time.

General Condition.—The pain which prevents exercise, the dyspepsia which impairs alimentation, the condition of the nervous system which has a depressing influence upon nutrition, all combine to alter the patient's general health rapidly, to give her a habitual chloro-anæmic color, a muddy complexion, dark circles under the eyes, and the air of suffering, which together complete the picture of the facies uterina.

It is this combination of rational signs which makes up the syndroma common to all diseases of the internal genital organs, but which is most marked in cases of metritis. The study of the physical signs, revealed by direct examination, permits now the precise statement of the characters proper to uterine inflammation.

Physical Signs.—By touch, which should always be practised with bimanual palpation, we find the cervix increased in volume and altered in consistence, except in those rare cases where the body alone is involved. It is larger and more open than normal, with a velvety or greasy feel when its surface is ulcerated; and in places there is the sensation of a number of little hard grains, which are glandular cysts. The finger discovers, moreover, the lacerations upon which I have dwelt in the section on pathology. By pressing upon the cervix, at the level of the external os or at the bottom of the tear, a severe pain is provoked, which may be of an acute neuralgic character. If this examination is not painful, the ballottement of the uterus, performed by giving a rocking motion to the cervix, hurts severely, and Gosselin [1]

lays much stress upon the clinical importance of the fact. Touch also informs us whether the cul-de-sac is free; the uterus being then perfectly movable.

The first examination with the speculum should be made by preference with Brewer's bivalve or with two single blades of Simon, in the lithotomy position. It discloses a very large cervix, of altered form, which at times fills the depths of the vagina: in nulliparæ, instead of being conical, as it should be, it is cylindrical; in a woman who has had children, it is often swollen, and if there has been a laceration, it may be peculiarly figured and of various forms. The color varies between bright red and violet. A discharge of viscid mucus, at times very purulent or mixed with bloody threads, escapes from the cervix; by the repeated gentle pressure of the speculum it seems to be milked from the organ. The surface of the part presents an eroded aspect, the apparent loss of substance being at times small and disseminated over the surface (the folliculitis of authors), resembling a slight vesication (erosion), or deep, smooth and polished, or granular (ulceration); at times yellowish grains indicate the superficial cysts called Naboth's ovules. Lacerations are often less perceptible to the sight at the bottom of the speculum than to the touch, and the ulcerated surface is far less displayed by a cylindrical speculum than by a bivalve.

To separate the lips, and see into the cavity of the cervix, one can use Courty's forceps or two tenacula. Rectal is a useful addition to vaginal touch, but it may be negative in simple metritis.

The use of the uterine sound demonstrates in most cases an increase in the depth of the uterine cavity which may reach as high as 8 cm. ($3\frac{1}{2}$ in.). When the sound passes deeply in, there may be another explanation for it than metritis. When the uterus is displaced to one side (which often happens in deep laceration, where it is bent toward the torn side), the sound does not measure the exact height of the organ, but that of a line obliquely directed toward the cornu opposite the side to which the uterus is bent—thus there is an apparent elongation which does not really exist. To rectify the error when there is reason to suspect its presence, the uterus can be raised by bimanual palpation or the patient may be placed in the genu-pectoral position, which straightens the uterus considerably.

The sound often causes pain, but it is an exaggeration to say with Veit that one can thus determine the exact point where the inflammation is most marked. In reality it is often the movement of the

organ as a whole, rather than the friction of the mucous membrane that causes the pain. The escape of blood as soon as the sound has passed is a sure indication of altered mucous membrane: if there are fungosities present, they can usually be felt by the sound.

The Different Forms of Metritis.

Acute Form.—At the beginning of a metritis there is often a chill with fever. Such acute phenomena are at times present in the course of a chronic metritis as the result of some special fatigue or at the menstrual epoch. However, it may be, when the metritis takes this form either acutely or gradually, direct exploration reveals the peculiar sensitiveness of the organ, the heat of the vagina, where the finger perceives a throbbing at times, the redness and swelling of the external os—in one word, all the classic signs of inflammation. They usually disappear very quickly, but may return if there is a renewal of the cause.

Catarrhal Form.—In this form two features predominate, namely, the erosion of the cervix and the leucorrhœal discharge. I have already described the appearance of the eroded cervix and do not need to repeat it.

This form is observed most often in young women and is accompanied with reflex nervous symptoms (palpitation, dyspepsia, etc.) which I have already enumerated. The principal portion involved is the region of the cervix; it is the cervical catarrh of authors. I believe it a mistake to describe it as a circumscribed lesion, for there is always a concomitant alteration in the mucous membrane of the uterine body, and in therapeutics of the part this must not be neglected, or our treatment will disappoint us.

Hemorrhagic Form.—Here, on the contrary, it is the uterine body which especially suffers, while the cervix may remain comparatively healthy. We meet with this form chiefly in young girls at the establishment of menstruation and in women near the menopause; it is also the form most common after abortion, when the almost invisible particles of the decidua graft themselves on the mucosa and set up a lasting inflammation. Early abortions are often unrecognized and their pathogenic influence is felt more frequently than is supposed.

In the catarrhal and hemorrhagic forms which have lasted a long time, we observe those profound alterations of the mucous membrane of a vegetating, fungous nature which we call polypi. This exuber-

ant proliferation of the interstitial and glandular elements may also be found on the cervix; it then appears externally and constitutes a new symptom, but that fact does not warrant us in giving the affection a new name. Mucous polypi and follicular hypertrophy of the cervix are lesions of metritis and should be described with it both anatomically and clinically. I have already described their histological nature above. The appearance of these polypi recalls that of the nasal variety; they are red or violet in color, of the size of a hazelnut, sometimes furnished with a pedicle, sometimes sessile. It is easy to recognize them by touch or speculum.

Follicular hypertrophy of the cervix is due to a glandular vegetation in the thickness of one of the lips, which thus presents a hypertrophic elongation and a soft consistence, is marked by many fissures, and can be brought down to the vulvar orifice.

The polypi give rise to frequent serious bleeding; the elongation is an accompaniment of the catarrh.

The hemorrhagic form may cause almost continual losses through many months, with very short intervals; some women are thus brought to an extreme degree of anæmia. The discharge of the blood occurs most often without colic; the patients complain only of more or less intense lumbar pain, and present various neuralgic points.

Chronic Painful Form (*Chronic Metritis*, *Engorgement*, *Uterine Infarction*).—I have called this the painful form, for the pain and its consequent weakness are the chief features.

It is absolutely false to represent chronic metritis as the sequel and residue of an acute attack. It is far more correct to say that it is the result of an infection which has developed slowly, slumbering a long time after the infecting cause has disappeared; a state of things which Verneuil has described as latent microbism.[16] Such a case has an insidious course, deceiving respites, and unnoticed exacerbations; so that there are many points in an old focus of osteitis which clinically resemble a case of chronic metritis, for in the intervals between exacerbations, both the one and the other are more of an infirmity than a disease.

Sometimes the case is one of localized puerperal infection, of a very slow course. The delay in the normal involution, the engorgement as certain authors say, is characterized by an abnormal volume of the uterus, a feeling of weight, pain in the loins, discomfort in standing or walking, and dysmenorrhœa. These first symptoms may be unnoticed during the early months; the woman merely feels ill

after some unusual fatigue, attributes to this cause all her trouble, and forgets the already distant labor or abortion. Later on the pain becomes more severe, and enforces more or less complete repose. The local examination reveals a different condition according as it is made during the exacerbations or at other times. In the former case we have the signs already described with acute metritis. At other times we find the cervix somewhat swollen, hard, perhaps sclerosed, often of very irregular form, due to old lacerations, of an almost wooden consistence in places, and at other points feeling as if covered with small nodosities like grains of shot (glandular cysts). The speculum discloses this granular appearance and a variable congestion which often has a very characteristic coppery look. If there are lacerations, one can observe the ectropion of the mucous membrane, but there is seldom any such fungosity of the ulcerated surface as in the catarrhal form; it is far more likely to be smooth as in a cicatrizing ulcer. Touch often reveals an accompanying displacement; but the sound does not give any marked increase in the depth of the organ.

There is one variety of chronic painful metritis which deserves a special description; it is that which passes under the name of membranous dysmenorrhœa, exfoliating endometritis, or decidua menstrualis. The capital symptom is the painful extrusion at the menstrual period of all or a part of the uterine mucous membrane; this presents the histological alterations of acute inflammation (acute endometritis, Fig. 96). These patients may suffer very little between their periods, though indubitable signs of metritis are present, such as leucorrhœa. Many authors, however, have overlooked this source of the disease and made it a distinct variety of metritis. Others, as Schroeder, have seen the relation: he says in one place, "chronic catarrh is found so often that it may be considered as the cause of the disease."[17] If the origin of the affection be sought, we find almost always that it followed labor or abortion, more rarely that it appeared at the establishment of menstruation (the importance of these phases of the genital life in the development of metritis is well known). This disease may then be described as a chronic metritis with acute exacerbations and inflammatory desquamation of the mucous membrane at the time of the regular period. Therefore it enters clinically into the chronic form, and anatomically belongs to the acute. At times the membrane is passed in shreds; at other times the sac is complete, and the form of the uterine cavity can be recognized, the internal surface being grooved in little furrows, the external being

irregular and jagged. This membrane must not be confounded with the product of an abortion, where an attentive examination (especially after short immersion in picric acid) reveals the chorionic villi.[18] On the other hand, the presence or absence of cells of the decidua is not pathognomonic.[19]

This special manifestation of chronic metritis lasts until the menopause, unless energetic treatment is begun; it may accompany menorrhagia. Although it usually produces sterility, pregnancy may occur, with a return of the disease after labor.

Course, Prognosis.—All the forms of metritis are rebellious; the mucous membrane, the muscular tissue, the parenchyma, become involved in turn; then follow uterine sclerosis, cyst-formation, etc. Sometimes the sequel is the morbid condition which we know as chronic metritis, for every case which is not rapidly cured tends to become chronic. Scanzoni asserts that he has never seen a case of chronic metritis cured, but he does not distinguish clearly enough between that and salpingitis.

Does metritis predispose to cancer? We have seen that a number of foreign authors do not hesitate to say that the combination of cervical catarrh and a laceration offers favorable conditions for the appearance of carcinoma (epithelioma). An inflammation of the mucous membrane of long duration, when it takes the glandular form, may lead to the formation of adenoma; now, when the epithelial vegetation passes the limit of the cul-de-sac, the typical adenoma becomes atypical, and by a progressive transition, an actual cancer of the cervix is produced.

Diagnosis.—The causes of error may come from exaggeration of one symptom, or from neglect of concomitant signs.

The increase in size alone, or with the dyspeptic symptoms, may simulate beginning pregnancy, especially if there is amenorrhœa; the question can be determined by waiting or by the various exploratory methods.

The abundance of the leucorrhœa with the cervical laceration may give the idea of cancer; the characters of the one and the other are, however, very different: in cancer the discharge is not muco-purulent and viscid, but serous, of a reddish color, having a peculiar stale smell: the ulceration is seamed, sown with yellow points, and bounded by hard borders when it is not of a cauliflower form: it destroys the supporting tissues so that there is a marked loss of substance, which is never found in the pseudo-ulceration of metritis. The hard and

nodular swelling of the cervix, due to the development of sclerosis and cysts together, gives to the finger the feeling of cancer, it is true; but puncture of the cysts and incision of the cervix to remove the congestion will make the diagnosis very clear. If necessary, a small section may be cut from the part and examined by the microscope.

Strong regular pains, a very tenacious discharge of fetid muco-pus mixed with blood, a great increase in the size of the organ, and the examination of pieces removed by the curette, confirm the diagnosis of carcinoma of the uterine body.

The metrorrhagia produced by an early abortion must not be confounded with hemorrhagic metritis; the study of the matters expelled and the patient's antecedents should enable us to decide.

Fibrinous polypi, or better placental, are nothing but the débris [20] of the placenta or chorionic villi which have remained planted upon the uterine mucous membrane, and which may continue their obscure life there through many weeks or even months [21] after labor or abortion. The patient's own story, and the examination of pieces scraped away with the blunt curette, will soon show what is the origin of the little tumor.

Fibrous polypi, if intra-uterine, may give rise to a symptom-complex like that of metritis with abundant hemorrhage. Examination by bimanual palpation, the uterine sound, and, if necessary, dilatation of the cervix, should prevent error here.

Salpingitis, as I have said, often coexists with metritis. The diagnosis consists in deciding which of the two lesions predominates, and gives, therefore, its character to the malady. Bimanual palpation, perhaps with the aid of anæsthesia, should be employed to discover the condition of the adnexa. If they are not augmented in volume but only a little painful on palpation, while the uterus presents the objective signs which I have described, the diagnosis is clearly metritis.

I have described the existence of metritis symptomatic of primitive and non-inflammatory disease of the adnexa; by that I mean that a lesion of a tube, an ovary, or a broad ligament may be reflected in the uterus.[22] It is difficult to say in what way the uterine mucous membrane becomes affected, but we cannot deny that it does alter. A small ovarian tumor has been the starting-point for profuse bleeding, with hyperplastic endometritis which was confirmed by autopsy. Brennecke [23] and Löhlein,[24] who reported cases of this kind, thought that reflex hyperæmia caused by the ovarian irritation was sufficient to produce the mucous hyperplasia. It must be acknowledged

that this state of permanent congestion creates a peculiar morbid receptivity, owing to which the numerous causes of infection—germs dwelling within the vagina and germs from without—are able to exercise their evil influence and overcome an organization already enfeebled by inflammation.

As regards diagnosis, there are two well-established facts which the clinician must not forget:

1. There is but a narrow limit between inflammations of the uterus and of the adnexa; we should always seek for the latter, therefore, because whether it be protopathic or deuteropathic, its existence may become very important in consideration of operative interference.

2. Alterations in the ovaries, whether inflammatory or not, may simulate metritis by their reflection upon the uterine mucous membrane; the alteration, at first simply congestive, tends to transform itself into a veritable inflammatory lesion.

Cystitis may occur with inflammation of the uterus or resemble it by the pain which it causes. The same is true of proctitis with tenesmus and a glairy secretion (anal leucorrhœa), which we see at times appearing with an acute metritis with which it is connected. In such a case we must be careful not to see the effect and overlook the cause. I have seen a sphincteralgia in one case, which yielded to the cure of a catarrhal metritis. Very exceptionally a rectal disease provokes symptoms of pseudo-metritis. I have published[25] a case of rectal polypus which for a long time gave rise to signs which were thought to be due to metritis. Rectal touch enabled me to discover the cause of the disease and cure it by removal of the polypus; the patient had mistaken for metrorrhagia a bloody discharge which really came from the rectum.

The disturbance of the general health is often so severe that it entirely masks the local lesion. The patient may complain of persistent cough, or loss of breath, or progressive emaciation, and say little about her leucorrhœa and abdominal pain. One is often inclined to think of pulmonary tuberculosis until auscultation reveals the error. With other cases it is the symptoms referable to the stomach which predominate; loss of appetite, flatulence, gurgling, with percussion and succussion, demonstrate the existence of dilatation of the stomach. It is present, but is only symptomatic of a metritis of which it is a sequence. Finally the number of young women who suffer from precordial anxiety, palpitation, and in whom the stethoscope reveals cardiac and vascular murmurs, is very large; on examining the

uterus also, we very quickly recognize that we have to deal with a metritis or, less probably, with a lesion of the adnexa.

The rule should be, therefore, to carefully examine the uterus in every woman with a chronic disease.

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CHAPTER VII.

TREATMENT OF METRITIS.

The prophylaxis of uterine inflammation made a great step forward when antisepsis was first followed in obstetrics. It is to a more or less localized and attenuated puerperal infection that the majority of cases of metritis are due.

The complete cleansing of the uterine cavity after labor and abortion of all débris of membranes and placenta has a capital importance here. In my opinion, the discussion whether expectance accomplishes more than active interference is all wrong. Budin[1] has raised his voice too loudly against what I call the exaggerated fear of accident from the expectant plan: he bases his ideas upon statistics of all cases treated in the maternity service of la Charité during a period of three years, comprising 46 retentions in 210 cases of abortion: did he notice that septicæmia occurred but four times, and only once with a fatal issue?

Budin combats hemorrhage by tampons, septic accidents by vaginal and intra-uterine injections of sublimate (1:2,000 or 1:3,000) or carbolic (20 or 30:1,000), with quinine internally. Surely one can, no doubt, thus remove the immediate trouble, but is it the same with the sequels, metritis and salpingitis? As surely not! Are the patients really cured who have escaped from death? For my part I cannot combat this therapeutic cowardice enough. If there is reason to fear that a portion of the fœtal structures has been left within the uterine cavity, no time must be lost before making exploration, thorough cleansing, and disinfecting; do not await the appearance of hemorrhages, for by that time the mucous membrane is already infected. The dull curette of Récamier, and weak injections of sublimate, are the best means at hand.

After thorough use of the curette, followed by a hæmostatic injection of perchloride of iron and antiseptic irrigation, the temperature is seen to fall one or two degrees if it has been high before; one can prevent fever and insure rapid recovery where the decomposition of

the débris has not yet begun. The "écouvillon" (or scraper) which has been advocated for this purpose, is an altogether unsuitable instrument, as is shown by a case ending in death, published by one of its partisans.[2] It is evident, *a priori*, that it has not sufficient force to detach by scraping the often firmly adherent débris.

Before mentioning the special treatment suited to each case I will describe the therapy which is applicable to all alike.

It has been recommended to immobilize the abdomen with a bandage of ticking, elastic tissue, or a band of flannel making two turns

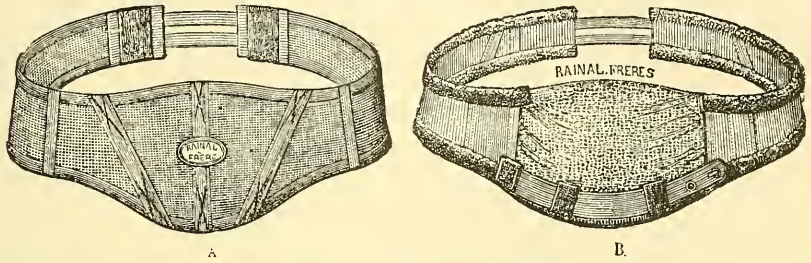


FIG. 113.—ABDOMINAL BANDAGES. *A*, Of elastic stocking tissue; *B*, of webbing for stout women who do not stand compression well.

round the body, a little obliquely from above downward; this affords much comfort in walking.

All fatigue and all violent efforts must be forbidden, and the sexual relation given up.

The constipation is best combated by means of proper food (vegetables, Graham bread, prunes, etc.), mild laxatives (mineral waters, rhubarb and magnesia, etc.) and enemata, to which we can add a spoonful of glycerin. Certain patients find it well to take at meals a spoonful of white mustard in water; this mechanically provokes hypersecretion and contraction of the intestine. Long-continued use of drastic purgatives, like aloes, podophyllin, etc., has its own inconveniences, but we have to employ them at times. It is very important to unload the large intestine and thus relieve the pelvic viscera.

The patient's general condition must be kept up by tonics which are suited to her; for women who are of a lymphatic temperament, cod-liver oil and phosphates; for the arthritic, preparations of arsenic; for almost all, iron, with quinine and rhubarb may be administered with success. Lastly hydrotherapy is a powerful auxiliary, especially where the metritis has produced anæmia and nervous symptoms, as it so often does.

There is no other disease where mineral waters have been so

strongly recommended. They certainly have a good effect on the general state, and indirectly on the local. I think that the chief indication is to take care of the patient's general condition and of the reflex disturbances of the chief organs which may be produced by the uterine disease. If the patient is very anæmic, we prescribe in preference ferruginous waters, or sulphur and arsenical with sea-bathing: for dyspeptics, alkaline waters and gentle purgatives; for the nervous, indifferent waters, but a spa which is pleasantly situated, and on high ground. Finally, springs charged with chloride of sodium have an incontestable action, not only on the scrofulous and lymphatic constitutions, but also on all visceral congestion, and may be of real benefit in the beginning of certain forms of chronic metritis where the engorgement of the body predominates without great alteration in the cervix.

Special Treatment of each Form.

In acute metritis the rest in bed must be absolute: sitz-baths are prescribed with the introduction, while in the bath, of a small speculum, which allows the water to reach the cervix; and repeated mild

Fig. 114.—Bath Speculum.

purgatives should be given. If the pain is very severe, it may be calmed by laudanum in the vaginal douche or by opium suppositories. The daily application of a glycerin tampon, which is left in place twelve hours, is an excellent antiphlogistic; the glycerin, having an affinity for water, causes considerable flow of serum. The patient can be taught how to introduce the tampon herself, with the aid of a cylindrical speculum which she guides by a long handle; the speculum is then withdrawn, leaving the tampon in place.

Hot vaginal douches (45 to 50°. C.) kept up for a long time are of great service. This therapeutic measure, advised by Sédillot and Trousseau, generalized anew by Emmet and other American and English gynæcologists, is capable of many applications, but it is well to give precise directions for its employment.

The injection, or better the irrigation or hot douche, should be

taken by the patient lying at the edge of the bed, her legs supported on either side by a table or chair, and the pelvis a little elevated. For greater convenience a basin or a piece of rubber tissue should be placed under the buttocks, folded along the edge into a gutter and leading into a pail below (Fig. 5). The vessel containing the water should hold not less than three litres (Fig. 2); it is filled with water at 45° C. (115° F.) (there is always a loss of two degrees in passing through the apparatus), and raised about one metre above the patient.

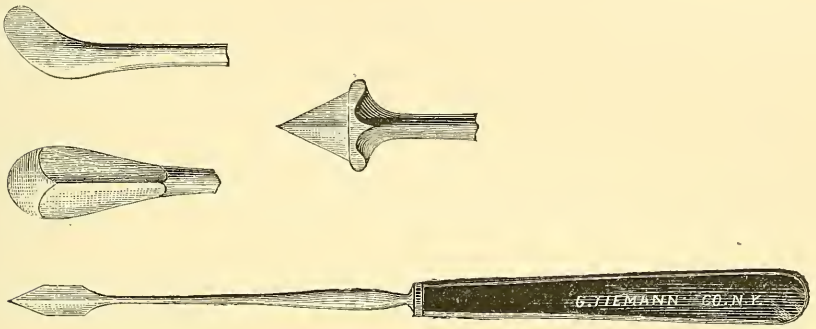


Fig. 115.—Cervical Scarificators.

The vaginal tube is then gently pushed up as far as the cervix. It is well before beginning the injection to cover the vulva and perineum with vaselin; the action of the hot water is then less disagreeable. From three to ten litres may be used at one time and the douche repeated twice a day; after each, it is well to pass two fingers into the vagina and depress the fourchette strongly to allow the escape of the accumulated water; then a glycerin tampon may be introduced and the patient ordered to rest an hour in bed. That the acute stage may not be too prolonged, we may have recourse to scarification—local blood-letting. The scarificator (Fig. 115) can be used for this purpose, but there is no need for a special instrument. An ordinary bistoury round which is rolled a band of diachylon that leaves only about one centimetre of the blade free, will do as well.

After the vagina has been well irrigated, a cylindrical speculum is passed in and the cervix displayed; then it is pierced in a dozen different points without going far beyond the external os. To render the little operation antiseptic and aid the flow of blood, a continuous irrigation of warm carbolic solution (1:100) is kept up. This is very easy to do with the little funnel which I have adapted to the speculum (Fig. 72). When the blood has flowed long enough, the spec-

ulum is removed, the vagina emptied, and a tampon of iodoform gauze placed upon the cervix, which stops the bleeding.

This method is much better than the use of leeches, does not require anæsthesia, being painless, and may be repeated as often (every other day) as deemed necessary.

Exfoliative metritis or membranous dysmenorrhœa is both anatomically and clinically an acute metritis, or better the acute stage of a chronic metritis. Generally every other treatment than curetting fails. This means, on the other hand, gives excellent results.[3] It should be followed by an injection of tincture of iodine. If there is at the same time stenosis of the cervix, both that and the pain are treated at once by dilatation with laminaria tents or Ellinger's dilator.

Landowski has published[4] cases successfully treated by the galvano-cautery; the method is a good one, but I consider the curette more expeditious.

Acute gonorrhœal metritis should be energetically treated by antiseptic and slightly caustic vaginal and intra-uterine injections. Alph. Guérin has described the good effects of an intra-uterine injection of a weak solution of nitrate of silver (gm. 0.05 to gm. 30 of water).[5] Fritsch[6] has recently recommended the use of chloride of zinc, 1:100, for the vagina; more concentrated for intra-uterine cauterization. Both the vaginitis and the endometritis, which depend upon each other, may be treated together. We may find in any case that the inflammation has already disappeared from the vagina and taken refuge in the uterine cavity or the urethra; it is in this latter place that we seek the last traces by which to characterize the nature of the uterine affection. For the vaginitis and the urethritis injections of bichloride have always given excellent results, joined with the use of crayons of iodoform; the sublimate should be of the strength of 1:2,000. For acute gonorrhœal metritis I employ curetting followed by intra-uterine cauterization with concentrated chloride of zinc on cotton rolled round a sound.

Catarrhal Metritis.—The general treatment already described should be most carefully followed; this is the form where chloro-anæmia very rapidly appears and the general treatment must aid the local as much as possible.

This is also the form where it is most necessary to maintain entire cleanliness and rigorous antisepsis of the vagina; thus one acts indirectly it is true, but very efficaciously, upon the cervix which is often

the part most deeply affected. By advising the patient to rest in bed after the morning injection, and to take the evening one in bed without rising afterward, a certain quantity of the medicated liquid is kept in the upper part of the canal, making a kind of local bath which is of excellent effect. The 1:3,000 solution of sublimate is the best for injecting, but it must not be continued for too long a time, because of the danger of mercurial poisoning. Other good injections may be made by adding to a pint of water a tablespoonful of powdered tannin, or two of boric acid, or a dessertspoonful of alum in powder.

To cure metritis completely it is necessary to attack the interior of the organ. The three principal procedures of intra-uterine medication are: antisepsis, cauterization, and curetting, employed together or singly. To these it is often necessary to add surgical treatment for the cervical ulcers and lacerations which play so important a part in the catarrhal form of the disease.

I will follow this order in the description of the different therapeutic measures.

Cleansing of the Uterus.

Intra-uterine Irrigation.—Large injections of some feeble antiseptic must not be confounded with the use in smaller quantity of agents which are more powerfully caustic. Schultze[7] has especially praised this method. He dilates the cervix with laminaria, introduces a uterine catheter, and washes the cavity with a copious injection of weak carbolic solution (1:50). This treatment is not enough in obstinate cases, and I think it should be reserved for those light attacks where there is no great change in the mucous membrane, for there it is useful. The injection may be given every day through a two-way catheter; if there is any difficulty in introducing it, the cervix should be dilated by tent or instrument; a half-litre is used at a time. When the patient does not soon recover after the employment of these simple measures, we must have recourse to cauterization and the curette.

b. Drainage.—Fehling employs glass drains pierced with holes; Ahlfeld, hollow cylinders of rubber; and Schwartz[8] wicks of spun glass which act by capillarity. It does not seem as if these devices had given as good results in the hands of others as their authors and their pupils have obtained. I believe that the presence of a foreign body in the uterus would be more likely to keep up the metritis than

to cure it. It is otherwise with the capillary drainage of a piece of iodoform gauze described in the next paragraph.

c. Tampons.—Fritsch,[9] since 1882, has employed the following measure in gonorrhœal metritis: he passes into the uterus a strip of iodoform gauze 75 cm. in length and 2 to 3 cm. broad, packing it into the cavity "as one fills a hollow tooth"; then he removes it and repeats the manœuvre, thus thoroughly cleaning the uterus. After this he introduces another, allows it to remain twenty-four to forty-eight hours, and if it produces colic it is removed by pulling the end which hangs out of the vulva. As is easily seen, this procedure has for its object both the cleansing and the antisepsis of the uterine cavity. But it seems to me much less simple than curetting followed by cauterization, and I reserve the uterine tampon for energetic disinfection when it is necessary (as in cancer of the body, sloughing fibroma, etc.), or I employ it as a hæmostatic after enucleation of fibromata.

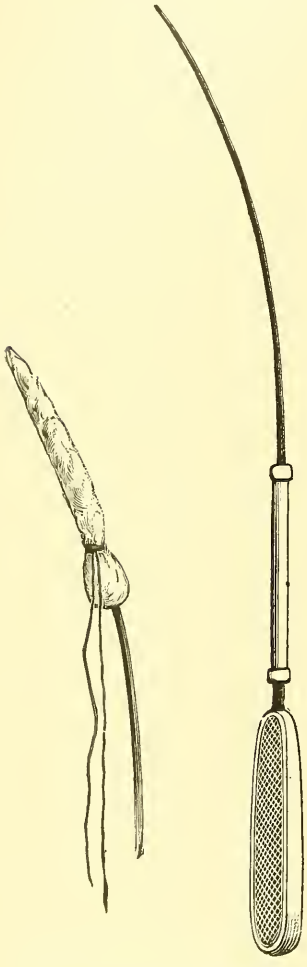


Fig. 116.—Sims' Slide Applicator.

d. Sweeping with a Tampon and Scraping.—Many gynæcologists content themselves with dilating the cervix and cleansing the uterine cavity by means of a pledget of absorbent cotton rolled on a handle. This is very simple, and the cotton will be securely held on the handle if the end of it is a little irregular; Fritsch, Tenneson, Ménière, Sims, and Mundé[10] have invented special applicators; but a sound with no terminal enlargement is all that is required (Fig. 116). It is easy to make pledgets of tapering form, so that they can be passed into a cervix but little dilated. It is well to soak these in a 1:1,000 solution of bichloride, or carbolic 1:50, to gently squeeze the excess out before introducing them, and then to turn them about within the uterine cavity so that the walls of the organ shall be thoroughly wiped clean. The last tampon may carry the caustic.

Doléris [11] prefers to this simple means the employment of a scraper like that used in cleaning bottles (Fig. 117); the instrument, designed to brush the interior of the uterine cavity, is rendered aseptic by immersion in 1:100 sublimate solution, and then introduced by a spiral motion, which is kept up in different directions until it is removed. Both the scraper and the tampon may be charged with various medicating solutions. Doléris thinks that by using scrapers with harder or softer bristles, he can effect both a cleansing and a scraping of the mucous membrane, with destruction of it if necessary. That this is an illusion will be clear to all those who are accustomed to use the blunt curette, and know the amount of force necessary to remove the membrane with a dull instrument; it seems to me impossible by simple friction of the mucous membrane with a brush to destroy its elements.

The instrument is, therefore, illusory, and, like the tampon, cannot be successful as a means of either cleansing or medicating the uterus.

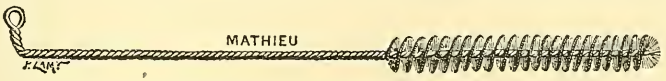


Fig. 117.—Doléris' Écouvillon.

From this double point of view, it is not much superior to the tampon, which I employ almost wholly for the cervical cavity, preferring to clean the uterine by irrigation.

There are cases, especially in nulliparæ, where the cervix is full of muco-pus, but the external os is narrow and prevents the escape of the secretion. It is better then, instead of dilating, which would require to be repeated, to make a small crucial incision of the orifice; this may be done with scissors curved on the flat or a probe-pointed bistoury, and the cut should be about 1 cm. in depth. This will make applications to the interior of the cervix easy, as well as complete examination of the part and the decision of the question whether a more energetic treatment is necessary: the small incisions heal very quickly.

Intra-uterine Cauterization.—The employment of solid caustics —such as Becquerel and Rodier's medicated crayons, Courty's pencils of nitrate of silver left in the uterine cavity, which Spiegelberg removes with a catheter and a metallic thread: the uterine pistol of E. Martin (senior), imitated by Storer; and the porte-caustic of Dittel —all have the common defect that they blindly leave in the uterus

a caustic with an action either too strong or too feeble. The direct momentary application of the agent by a porte-caustic is preferable: but beforehand the cavity should be thoroughly cleaned by irrigation or tampons.

Dumontpallier, as Polaillon had already done, introduces into the cavity a pencil of Canquoin paste (chloride of zinc).[12] He produces thus a destruction of the tissues which certainly may pass beyond the mucous membrane and, I think, obliterate the orifice of the Fallopian tube and cause contraction of the cervical canal.

Galvano-cautery has been used by Spiegelberg[13] for a long time, and advised anew by Apostoli.[14] It seems both less easy and less sure to me; for it may cause sterility by lining the interior of the uterus with cicatricial tissue.

Liquid or sirupy caustics are easily applied with a thin pledget of cotton wrapped on a handle or special sound. The method has been employed by many authors since Miller[15] and Playfair recommended it. Pajot[16] uses nitrate of silver in a solution of equal parts, or in powder as Richet also does, or as a paste, also acid nitrate of mercury, anhydrous nitric acid, chloride of zinc, perchloride of iron, the thermo-cautery or the actual cautery; excepting four cases of metro-peritonitis, he has never seen a serious accident. Pajot does not draw the uterus down; he carries in the caustic with the aid of a long, flexible whalebone applicator to which is fastened a piece of cotton, very much as Sims employs it.

Rheinstädter[17] and Broese have recently advised anew the use of chloride of zinc, dissolved in its own weight of water, as an intra-uterine caustic, applied with the cotton-wrapped applicator. This method, according to Broese, never produces contraction of the cervix, and may be repeated every week or twice a week, without confining the patient to the house. The uterus does not need to be held, and the caustic is rapidly passed in through a cervix dilated enough beforehand to prevent any difficulty in penetrating into the cavity. The contact is prolonged only one minute, and any drops which might attack the vagina are to be carefully wiped off. [In using any strong intra-uterine caustic it is advisable to protect the vagina by thin tampons soaked in a strong solution of sodium bicarbonate, squeezed dry and packed about the cervix.]

Caustics much employed in America are weak nitric and concentrated carbolic acids. The cervix must be previously dilated, and certain precautions taken, or the applicator reaches the uterine cavity

after most of the caustic has been squeezed out, or its strong action at the level of the cervix may cause subsequent stenosis. After such a cauterization it is necessary to cleanse the uterine cavity with great care.

Peaslee has invented a speculum designed to protect the cervix from the action of the caustic, but it is not convenient in use; a simple tube of glass, such as Woodberry of Washington employs, would be better. For the same purpose, Joseph Hoffmann wraps the end of a slender syringe tube, pierced with many holes, with cotton and then introducing it to the fundus, forces the fluid out by the gentle play of the piston, thus affecting only the mucosa of the cavity.

I do not employ these methods. In spite of all precautions, it is difficult, whatever may be said, to avoid contraction of the cervix after cauterizing the entire extent of its orifice. But this is not the principal objection which could be made; for unless each cauterization is preceded by a dilatation, or the intervals are employed in tamponing to retain the dilatation, one cannot be sure of penetrating well into the cavity and reaching the fundus. Thus there is a part of the diseased membrane which is never touched; while the cervical portion is too strongly cauterized, the action is *nil* above. The first cauterizations by means of injections were made a long time ago by Lisfranc and Vidal.[18] Then followed much discussion as to the possibility of the fluid passing into the Fallopian tubes. This possibility is easily demonstrated upon the cadaver, under conditions not found in the living, but practically is very rare if two things are provided for: the canula must *not* fill the cervical canal, so that there may be plenty of room left about it for the fluid to pass out again; and no great force must be used, nor should the jet be directed in the axis of the uterus. With these precautions the injection may be made in safety; both are realized in syringes of different models, particularly Braun's, which is made of hard-rubber and may be used, therefore, with any fluid, as it does not become altered. The operation is a benign one; though we must not forget certain unfortunate cases, in some of whom there have been abnormal anatomical conditions (dilated tubes),[19] and in others an imperfect operative technique.

Many fluids are used; the best being tincture of iodine, glycerin and creosote, and perchloride of iron. It is enough to inject about three grammes, which equals the contents of Braun's syringe

(Fig. 118). I use the tincture of iodine a great deal, but only after a preliminary curetting several days before, followed by injection of perchloride of iron. I begin the iodine injections five days after the operation, and in very intense cases of catarrh I have done it every second day through two weeks.

FIG. 118. BRAUN'S INTRA-UTERINE SYRINGE.

I prefer the tincture of iodine in a solution of creosote (from the beech) in glycerin, 1:3 and 1:10, as Doléris recommends. The canula is introduced through a speculum, the axis of the uterus having been ascertained beforehand. If there is any difficulty, the cervix should be held firm with a bullet forceps, and gentle traction made on the lip opposite to the flexion, the vaginal walls being kept apart by the valves of the speculum. As the canula is slowly withdrawn from the fundus toward the cervix, the injection is performed with but little force. There is ordinarily no need to dilate the cervix, unless the canula cannot be freely moved about so as to effect the rapid outflow of the fluid. During the intra-uterine injection, the vagina is to be copiously irrigated to prevent cauterization of its walls.

I have seen acute pain, vomiting, and fainting follow such an injection, but never any serious accident.

The objection has been made to tincture of iodine, that it causes precipitation of albumin, and the formation of coagula within the cavity of the uterus. This is an error which Nott's experience has refuted.[20] The iodine simply makes a layer of very fine precipitation upon the mucous membrane, and its antiseptic action is thus prolonged for some time. The essential oils and aromatics, like creosote, etc., have a very fugitive action: and iodoform would be dangerous from the effects due to its absorption.

Curettage.—I adopt this word, already used by many authors,[21] which signifies the employment of the curette, and prefer it to the word "curage" (cleansing, as of harbors, wells, etc.), which has too energetic a meaning, or to "curettement" the German name, which is a stupid and barbarous term, like many others in German which have been borrowed from French. The uterine curette, which was invented by Récamier and fell into discredit, has again come into favor since the use of anti-

septics in gynæcology. To-day, in France as well as in other countries,[22] it occupies an important place in the treatment of metritis.

The choice of a curette is not a matter of indifference. There are many varieties, of which the principal are—the cutting spoon of Simon (which should be reserved for excision of cancer of the cervix and uterine fungosities very far advanced); the sharp ring curette of

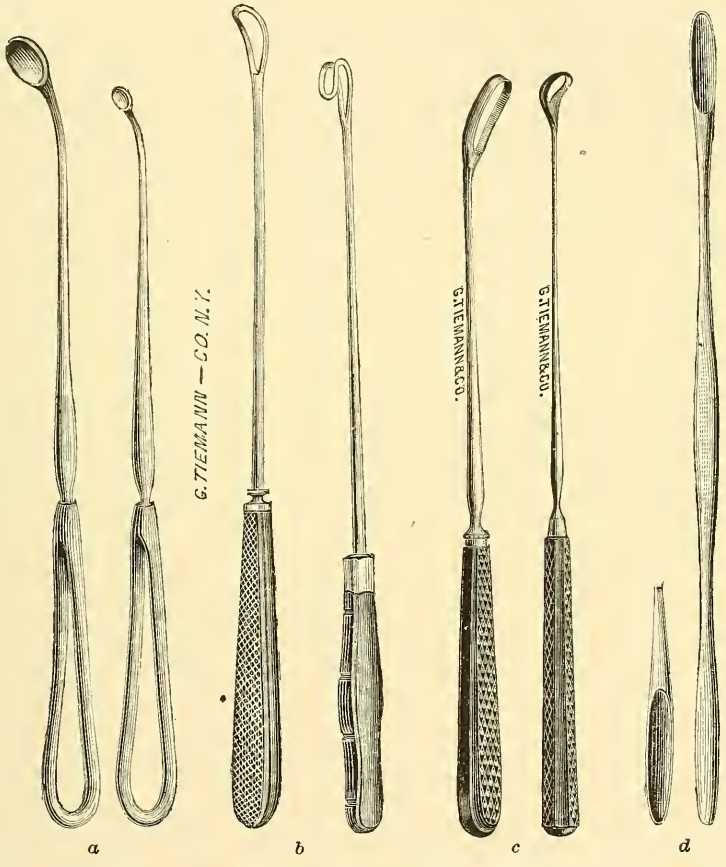


FIG. 119.—CURETTES. *a*, Simon's sharp curette; *b*, Thomas' dull curette and a hooked curette for removing débris from the uterus; *c*, Sims' sharp curette; *d*, curette of Récamier-Roux.

Sims (excellent for detaching polypi); the flexible dull curette of Thomas, much used in America; and the dull instrument of Récamier-Roux, which Martin has adopted and which I also prefer. It presents the advantage over the ring form, that it removes with it from the cavity the greater part of what has been detached (Fig. 119). Curettes are made with a hollow handle and a perforated top, to permit irrigation during their use. I do not find that this simplifies the tech-

nique, and they are hard to keep clean. I am a resolute partisan of the dull (by dull I mean that the edges are thin but not cutting, like a knife-blade which has not been filed) curette in endometritis; we have not here, as in cancer, to remove a resistant tissue; but simply to scrape a hard muscular wall, covered by a soft investment which is still further softened from inflammation. As is easily understood, it is enough to scrape the interior of the uterus with a narrow blade to be sure of detaching all that is not strongly adherent—and that is precisely the mucous membrane. Dull curettes have the further advantage that with them there is the least risk of doing injury to the parenchyma of the organ, for if the force used is never too great and is always directed obliquely, it is impossible to perforate the wall of the uterus (except in the post-puerperal state).

By the curette the whole thickness of the membrane is never removed; the glands penetrate to the muscular layer, and the terminal culs-de-sac remain attached to the parenchyma in spite of all scraping, however energetic, and serve to start a very rapid reconstruction of the membrane.[23] It is this fact which has led me to divide curetting, both in my course and in the thesis of Despréaux, my pupil, into "modifying" for metritis, "destructive" for malignant neoplasm, and "exploratory" where the purpose is to secure a small piece for diagnosis.[24] In the two latter cases the cutting instrument is to be preferred.

The mucous membrane of the uterus is unique in its special power of regeneration. What occurs in menstruation and pregnancy demonstrates that a layer equal almost to its whole thickness may be expelled and rapidly replaced. The curette produces artificially, and for a therapeutic object, a moulting of the membrane similar to that of the decidua; it substitutes, so to speak, in an antiseptic way, a regenerated mucous membrane for one infected by germs which has already suffered such changes that its repair would be very long and tedious. After curetting, the fecundity of the woman is no more compromised than after abortion or labor. This could be proved *a priori*, but the observations of Schröder, Martin, Düvelius, Benicke, Heinricius, etc.,[25] place the fact beyond all doubt; the work of the latter author is especially demonstrative. In fifty-two cases where he was able to follow the patient, sixteen, or 30:100, became pregnant; in two cases five weeks, in one eight weeks, after the curetting. One may, however, expect the next menstruation to default, and sometimes the second or the third; I have in one case seen amenorrhœa for four months.

Technique of Curettage.—The operation should be done by preference in the first days after menstruation. Though but little painful, I prefer to anæsthetize the patient. The preliminary antisepsis of the vagina and vulva should be carried out according to the rules laid down in Chapter I. The patient is placed in the dorso-sacral position, and the thighs supported by two assistants; the one upon the left of the operator draws down the short, flat valve which depresses the fourchette, the other holds the fixing forceps and the canula for continuous irrigation. The patient's knees being held in the axilla, each assistant has the left hand free and can at need hold one of the vaginal separators (Fig. 11). The cervix is drawn down to the vulva by a Museux's forceps, with teeth opposite, not over-riding (Fig. 120) which is fixed in the anterior lip. The uterine sound is first passed to determine anew the direction and depth of the canal, and then the curette is presented at the external os. Nine times out of ten it passes without difficulty; if any is encountered, the cervix is at once

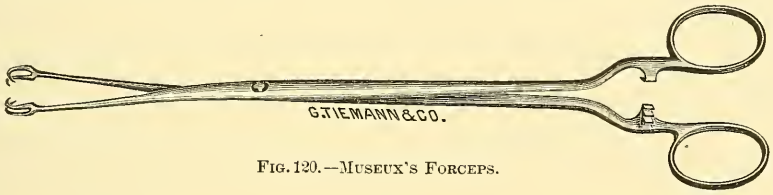


Fig. 120.—Museux's Forceps.

opened with an Ellinger's dilator or by passing one or two of Hegar's bougies. The curette is then directed toward the fundus of the uterus and the scraping is done by bringing it first over the anterior face, then the posterior, and the fundus, the angles and the sides in turn. After a few strokes with the curette, for which some force is necessary, the instrument is withdrawn, and at once plunged into a vessel filled with strong carbolic solution which is ready at the right of the operator. One can always pass twice over the same place, and make a second curetting, supplementary to the first, following the same order along the internal surface of the uterus. The operation should be done rapidly; not more than three minutes are required. Then a double-current catheter of Bozeman-Fritsch is introduced (Fig. 8), and the surgeon, seizing the canula from which a stream has not ceased to flow gently over the cervix, fits it to the catheter and washes the uterine cavity copiously with the same hot carbolic solution which has served for the continuous irrigation (1:100). A quarter or a half litre should be injected, until the water, at first bloody, returns but

little tinted; the effects of this are hæmostatic, antiseptic, and by it the clots and shreds of membrane are removed.

The catheter is taken out, and replaced by a Braun's syringe (full of perchloride of iron at 30° C., or of tincture of iodine), which is passed up to the fundus. As this is retracted, its contents are driven out little by little, scattering them through the cavity from fundus to os externum. During this time, continuous irrigation is kept up with a small jet against the cervix to wash away any caustic which might escape and irritate the vagina or vulva.

The Bozeman-Fritsch catheter is again introduced and for the second time the cavity of the uterus is thoroughly washed out; this removes the excess of the caustic, whose action should be rapid, and also the last remaining clots. If there is any difficulty in passing the double-current catheter, one can, without danger, practise the injection in small intermittent jets, by the aid of the long, fine canula which has served for the continuous irrigation, taking care only that the uterus is not distended or the cervix occluded by passing the canula too deeply.

When the operation is finished, a tampon of iodoform gauze is laid over the os, which may be taken out on the second day. Every morning and evening the vagina is thoroughly irrigated with 1:2,000 bichloride, and, if the catarrhal metritis has been very stubborn, if the uterine vegetations have been very plentiful, or if there are signs of salpingitis, we begin to make intra-uterine injections of iodine every second day; four to eight of which constitute a complete treatment.

For the first caustic injection which immediately follows the curetting, I use tincture of iodine when it is a case of recent catarrhal metritis; in an older case, or where the oozing demands it, I employ perchloride of iron.

Except in cases of pronounced flexion or stenosis, the previous dilatation may be omitted in women who have had children. It is not needed for the introduction of the instrument, it is illusory as regards the escape of the secretions, for artificial dilatation lasts but a few hours, and as to the débris and clots, they should be washed out by the irrigation. Now, this omission is not of trifling importance the first time; even slight dilatation is often very painful, the patient who has agreed to the operation has probably passed a sleepless night, she is in a state of great nervous excitement, and to this may be joined some fever due to the increase in the inflammation caused

by the dilatation. Therefore I have given up dilatation after employing it three years, unless there is special indication for it; following in this respect the example of Martin, Fritsch, and others.[26] The first of these observers has seen it cause serious trouble in a case of intra-cervical polypus which became gangrenous by its action.

To surgeons not familiar with the curette, perforation of the uterus by it seems a horrible possibility, but there is no danger of it if we operate with a dull curette and always obliquely as regards the uterine tissue, after clearly determining the direction of the organ. It must, however, be feared after labor and recent abortion, for then the uterine wall is very soft, thin, and perforable by very slight force. The patient's own statements, the size of the uterus, and the softness of the cervix should prevent any such accident. In one case of this kind I think that I made a perforation, because of the great depth to which my curette suddenly passed in the direction of the umbilicus; but I simply did not give the intra-uterine injection and the patient recovered with no other accident than bilious vomiting the day after the operation. Doléris has thought it possible to explain these cases as a false perforation, the illusion being produced by atony of the uterine wall which allows the curette to depress it into a funnel shape; this seems to me an error.[27] The reported observations on this point prove to me the comparative harmlessness of such punctures under antiseptics.

As a possible accident with curetting one may mention bleeding. In many hundred cases I have never met with it; the astringent injection which ends the operation permits nothing more than an insignificant oozing.

Subacute and localized peritonitis need only be mentioned; I have never seen a single case: exact antisepsis prevents it completely. Curetting the uterus is the rational treatment for catarrhal metritis. If simple measures have failed, general treatment, injections, local applications, etc., it will not do to hesitate. By waiting too long, time will be given for the alteration of the mucous membrane to become more advanced, the parenchyma of the organ is exposed to sclerotic changes and follicular degeneration, especially in the cervix, and, lastly, we must not forget the possible extension of the inflammation to the tubes, so frequent in old cases of catarrhal metritis.

Mucous polypi may be removed by seizing them with a flat forceps and twisting off their pedicle. If numerous and sessile, the cutting curette of Sims or Simon should be used and the bleeding surface

touched with perchloride of iron or the actual cautery. If the cervix is very much altered, if there is follicular hypertrophy, we have recourse to the operation of Schroeder described below.

Cervical "ulcerations" are only a new growth of glands, more or less hypertrophied, and are found only with deep inflammation of the mucous membrane of the body of the uterus, as was shown a long time ago by Gosselin in the reaction from the narrow doctrine which dissociated the two. Usually, to cure the ulcers it is enough to cure the endometritis. After curetting we see the ulcers disappear as does the coating from the tongue after vomiting, but this is true only of cases taken at the start. Later on, the glandular proliferation be-

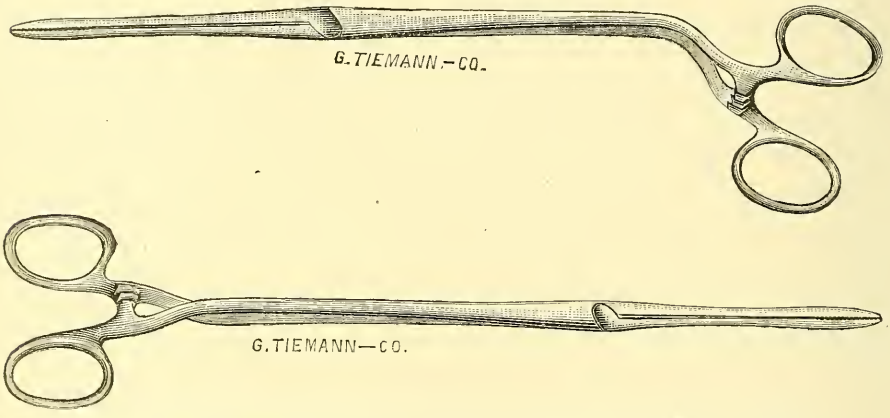


FIG. 121.—UTERINE DRESSING FORCEPS, STRAIGHT AND ELBOWED, FOR REMOVAL OF POLYPI.

comes a settled lesion and requires for its cure topical modification or removal by the bistoury.

As the first treatment of the ulceration, we must employ the curette; in the second place come applications of nitrate of silver or tincture of iodine, practised every second day. In America, weak nitric acid (not fuming) has been much used, applied with a very small tampon of cotton on the end of a handle; this caustic is preferred to chromic acid which has caused intoxication; but all such energetic caustics may produce contraction of the cervix, and I avoid them. The good effects of chloride of zinc have also been much praised. Rheinstädter advises the hastening of the action of this caustic in deep ulceration by making small punctures in the cervix. Hofmeier[28] strongly advocates acetic or pyroligneous acid. He incloses the cervix in a Fergusson's cylindrical speculum, pours in a certain quantity of the acid, and lets the part soak for a few min-

utes, the gentle action of the caustic attacking almost entirely the cylindrical epithelium and the ulceration. At the end of a number of these séances the epithelium has become pavement, stratified, and the ulceration is healed. The trouble may persist or reappear if it penetrate within the cervical canal and the os be narrow. In such a case it is advised to introduce the caustic into the interior of the cervix by tampons, which I consider dangerous from the stenosis that may result: in any case, only the weakest caustics should be employed, and they but for a short time. It is dangerous to attempt the cure of an old ulceration by caustics; for thus sclerosis of the cervix is produced, and cysts by the obliteration of the glandular orifices. But when the ulcer is recent, cervical cauterization following the use of the curette for the endometritis is excellent therapy, capable of giving rapid and lasting success. This distinction is important. It has not been made by Doléris and Mangin,[29] who condemn every attempt at "epidermization," even for the purpose of hastening the cure of a recent lesion.

When other means fail, or when the patient will not follow a treatment which demands months, asking to be rapidly cured, even by operation, then the surgical treatment is of great service. Excision of the affected mucous membrane by Schröder's operation has given excellent results; it substitutes a healthy for a diseased membrane and permits the removal of parts which have undergone cystic degeneration. It makes no large scar and hence is no obstacle to labor, as many observations prove. My practice is to do it after curetting, in the same session. The operation is especially indicated in the following conditions: in old ulcers of the cervix, with hypertrophy; in ulceration with stenosis of the canal; in ulceration with deep laceration. It is far superior to Emmet's operation, all of whose indications it fulfils.

Erosion Complicated by Laceration.—We know the capital rôle which this condition plays in uterine pathology according to Emmet. His enthusiasm has had the good effect of showing that the element of laceration, before neglected, is not, however, to be disregarded. Is it the previous inflammation of the cervix which prevents the laceration from healing, as Scanzoni thinks, or is it the laceration which provokes the catarrh and maintains the ulceration, as Emmet believes? I am inclined to fear that we have here one of those vicious circles that are so frequent in general pathology. At any rate, Emmet's operation, to which Dudley, of Philadelphia, has given the name of "tra-

chelorrhaphy," cannot be performed on an ulcerated cervix until it is healed, or else we shut the wolf up in the sheepfold. Emmet lays down a preparatory treatment which lasts months; there is hence no comparison between his and Schröder's operation: the latter is de signed especially for cervical catarrh, the former for nodular tissue due to laceration. For Emmet the ulceration is only accessory, the main lesion being the sclerosis which compresses vessels, nerves, and glands. For this reason I will describe trachelorrhaphy in the section on chronic metritis, since it is not a question so much of the ulcers seen in catarrhal metritis as of the cicatrices met with in the chronic form of the disease.

Lacerations, then, with extensive ulceration, demand excision of the mucous membrane, or Schroeder's operation, which procures the prompt healing of the ulcerations and at the same time restores the external os better than trachelorrhaphy.

When the surface involved is not large, it may be caused to cicatrize by the application of the actual cautery or simple caustic; but this means, good enough in mild cases, should not be used where the ulceration is extensive. The granulation tissue so produced is in itself a pathological element—a fact which does not seem to have been grasped by those gynæcologists who use and abuse the hot iron.

Hemorrhagic Metritis.—The treatment may be divided into two parts—for the bleeding, which is palliative but must be at once carried out; and for the disease itself, which should be curative.

Palliative Treatment for the Hemorrhage.—The patient is kept in the horizontal position, and prolonged vaginal injections of very hot water should at first be tried; ergot is of very little use. Gallard[30] has strongly advocated digitalis, which he says influences the symptom and the inflammatory state at the same time. He advises the infusion of the leaves (0.03–0.05 in 125 gm. of water), of which the woman drinks during the day by the tablespoonful. A remedy which I have tried with good results is fluid extract of hydrastis canadensis, in twenty-drop doses thrice a day; the medicine is also an excellent stomachic.[31]

Dilatation of the cervix or the introduction of a tent of laminaria will sometimes stop the bleeding temporarily, but the respite obtained is short. The action is due, no doubt, to contraction of the uterine body and to vaso-motor reflex.

As to injection of perchloride of iron, the amelioration is only temporary, whatever may have been published of cures from its use;

the patients were not followed long enough to prove any such assertions.

In case of persistent bleeding we may try vaginal tampons; they can be made with alum cotton (p. 80) or large pieces of gauze; ordinary iodoform gauze is too permeable, and Lister's carbolic gauze should be employed, made with resin; it is also well to powder it with iodoform. I will next describe a palliative measure which has given good results under Fritsch, and which I have seen Martin employ, viz., ligature of the uterine arteries.[32] It is done without incision into the vagina, by tying in mass across the cul-de-sac (see p. 117). Fritsch recommends, for greater surety, to make an incision on each side of the cervix, about 3 cm. long; the first branches met are two vaginal twigs, then more deeply the trunk of the uterine; both are tied. I do not hesitate to proceed thus in an urgent case.

The best hæmostatic, and at the same time the curative treatment, is curetting. It should be practised as soon as possible, according to the rules already given, and be followed by an injection of perchloride of iron at 30° C. The operation may be done while the bleeding is free; I have often seen it at once arrested after the curettage, which I attribute not only to the destruction of the bleeding tissue, but also to the contraction of the muscular fibres in the vessel wall provoked by the scraping. A single injection is usually sufficient; the cure is rapidly obtained.

There are certain rare forms called by the name of hemorrhagic metritis, where all means fail and the bleeding persists, threatening the life of the patient. In such a case the last resort is either castration, to produce an artificial menopause, or vaginal hysterectomy,[33] to remove the very source of the hemorrhage. The exciting cause may be an unrecognized alteration of the adnexa with a symptomatic pseudo-metritis. At any rate, this is our only refuge where all other means remain powerless and it is a question of the life of the patient.

Chronic Painful Metritis.—Local bleedings by scarification of the cervix find here a frequent application; not only is the immediate antiphlogistic effect desired, but also the evacuation of the cysts, superficial and deep, which are scattered over the surface of the neck of the uterus. As regards cauterization with the hot iron and thermo-cautery, and especially ignipuncture, so praised by certain authors, and whose usefulness I doubt, I consider them all inferior to puncture and scarification with the bistoury; the scars which follow

their use tend to favor cystic degeneration, by adding to the sclerosis, and also to cause contraction of the canal, and compression of the nerves, with the accompanying morbid reflexes.

It is very advisable to employ antiphlogistic dressings, consisting of a coat of tincture of iodine, to the cervix, followed by a glycerin tampon to which is added a very little iodoform. Some authors use a glycerin solution of iodide of potash (5:100), but I see no real advantage in this.

The application of a simple glycerin tampon must not be confounded with complete tamponing of the vagina, or its "columnization," as the Americans say (page 80). I refer to the method recommended by Bozeman, and extolled afterward by Taliaferro,[34] which is in general use; with many of the American gynæcologists it is the sovereign remedy for chronic metritis and the exudations of perimetritis. The column of cotton (ordinary) which fills the vagina is for the viscera what an elastic bandage is to a relaxed part (Engelmann[35]). It gives a support to the uterus and ovaries, removes traction from the ligaments, and provokes the absorption of plastic products.

Pallen, thinking that the cotton was insufficient, did not hesitate to fill the vagina with clay. Reeves Jackson rejected the cotton, which was apt to settle, and employed wool from which the grease had been removed, as being more elastic. I am content, unless there is a uterine deviation, to place a series of small pieces of glycerinated cotton carefully about the cervix in the cul-de-sac, packing them lightly so that they form a ring like a pessary. The best position in which to put the patient is the genu-pectoral, which permits the ascent of the viscera and assures their final support. The tampons may be left in place four or five days, if to the glycerin a little iodoform has been added. The latter, it is true, may give rise to accidents [36] if too long used; with the first signs of its absorption, such as malaise, headache, loss of appetite, and alteration of the urine, it should be discontinued. But these evil effects are never observed if it is used at intervals, with precautions against constipation, which seems to me to play an indisputable rôle in predisposing to its absorption.

Hot injections are often of great aid, in two conditions; in a chronic metritis where there is a complicating perimetritis, more or less pronounced; and with very sensitive patients who complain of acute pain, as in the case of what Lisfranc calls hysteralgia, chronic metritis without hypertrophy, and which Routh has termed the irri-

table uterus. In such cases I have had excellent results, and cannot too strongly recommend this special hot irrigation.[37]

Good effects have been obtained with electricity; for this a bipolar exciter is introduced into the uterus.[38]

Massage has been much recommended in chronic metritis, as well as for prolapse, displacement, and chronic perimetritis. There is a clear distinction to be made between general massage, a kind of passive gymnastics, which favors nutrition and can only be useful if practised with method; and local massage, which claims to dimin ish congestion and volume by manipulation of the diseased organ. This latter form consists in passing two fingers into vagina or rectum, supporting the posterior face of the uterus, and with the other hand above the pubis making gentle progressive pressure, like a kind of kneading. In spite of the favor which this method enjoys in Sweden,[39] in spite of the good results published by Reeves Jackson, Runge, Prochownik,[40] etc., I have hesitated to employ this two-edged tool, which might so easily cause some accident to the uterus or its adnexa. I will not, however, condemn a therapeutic measure which is espoused by serious gynæcologists, and which I have not employed; I merely reserve my decision.

There remain certain cases of chronic painful metritis, a great number of them, for which all measures are powerless; the cervix continues to be large, swollen, hard, and mammillated in spite of all scarification, topical applications, and thermal cures; the body is increased in size, heavy and painful on ballottement; the patients are so weak that the least walking tires them, all exercise is troublesome. It is in these cases that surgery renders great service by means of an operation which acts upon the cervix and reacts upon the uterine body; namely, amputation.

Amputation of the cervix in metritis has already a long history; Lisfranc used it and abused it;[41] then the operation fell completely into disfavor. To Carl Braun,[42] of Vienna, is due the credit of reintroducing it and establishing it upon a sound basis. Braun's great work described the alteration, the involution, which the body of the uterus undergoes after operation upon the cervix; following such an operation for hypertrophy, Braun saw a great diminution in the size of the uterine body. The autopsy of one of these old operation cases demonstrated that this decrease was due to a fatty degeneration of the connective tissue—an opinion, however, which is not well founded. It is very possibly due to the lessened congestion from the loss of

blood and to the rest in bed, but far more to an actual vaso-motor and trophic reflex, caused by the cervical traumatism. Whatever may be the explanation, the fact is undeniable that the volume of the uterus diminishes after every operation upon its neck, as I have often observed after the operations of Simon, Schroeder, and Emmet. Braun's work roused no enthusiasm until August Martin[43] demonstrated the important place in therapeutics which the procedure holds, and adopted a technique far superior to the action of the écraseur or the galvano-cautery employed by his predecessors.

It might be said that amputation of the cervix is always to be held as our last resort in all cases of chronic metritis with hyperplasia. Moreover, in cases of sclerosis of the cervix it restores the calibre and suppleness of the external orifice and stops the dysmenorrhœa caused by its rigidity and irregularity.

A complete contra-indication to the operation would be coexisting acute perimetritis; but I do not hold the same opinion where the inflammation is old, with sequelæ like adhesions, etc. There is always a fear that the ancient focus will become active after even a perfectly antiseptic operation upon the uterus, whether it be amputation of the cervix, curettage, or simply infra-traction. We must then, if we do not altogether refrain from surgical interference in such cases, be on our guard, and search out beforehand any focus in the adnexa or adhesions which may be present whence accidents may result.

The operative technique has been perfected and at the same time simplified by the use of a cutting instrument. The fear of hemorrhage was natural at a time when the operation was done laboriously at the bottom of the vagina. Moreover, the fashion was to employ various hæmostatic measures, like extemporaneous ligature, the linear écraseur, galvano- and thermo-cautery. Previous compression with a ring of rubber, which many operators advise, shows the same exaggerated prudence. When the operation is rapid, there is but little bleeding, which the sutures arrest at once and completely; we need, however, to tie them tightly and securely.

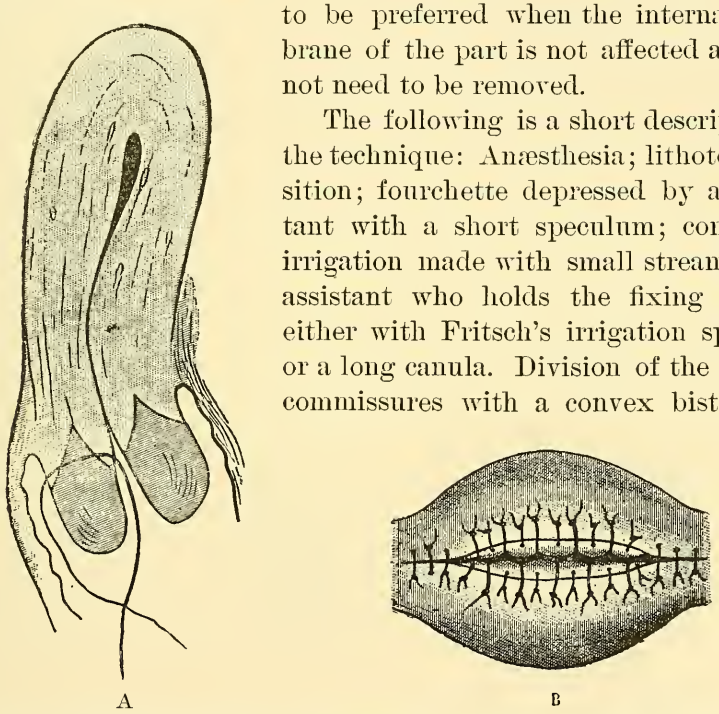
Every amputation by the écraseur or the galvano-cautery has the fatal disadvantage of leaving a harsh cicatrix, with concentric contraction, ending in stenosis. Other circular amputations with bistoury or guillotine have the same defect, though to a less degree, and the bleeding is hard to stop.

The only amputations which are to be commended are those which allow perfect coaptation and suture of the divided mucous mem-

brane, with the formation of an orifice not liable to contract. Two procedures of this kind may be adopted according to special indications (1) amputation with two flaps for each lip, or (2) with but one which may be so graduated as to become only an excision of the internal mucous membrane.

Amputation of the Cervix with Double Flaps—Conical Excision.—This procedure, suggested by Simon, generally bears the name of Marckwald,[44] who was the first to describe it methodically. It is to be preferred when the internal membrane of the part is not affected and does not need to be removed.

The following is a short description of the technique: Anæsthesia; lithotomy position; fourchette depressed by an assistant with a short speculum; continuous irrigation made with small stream by the assistant who holds the fixing forceps, either with Fritsch's irrigation speculum or a long canula. Division of the cervical commissures with a convex bistoury of



A B

Fig. 122.—Amputation of the Cervix with Double Flaps (Simon). *A*, Sectional view showing lines of incision for formation of flaps and method of suture; *B*, front view of cervix, operation complete.

large size or strong scissors. The incision of the anterior lip goes deeply through the internal surface, obliquely from below upward; the second, through the anterior mucous membrane, joins the other so as to form a conical segment of the anterior lip, its base below, its apex above. Suture of the two lips thus formed with a sharp needle, threaded with catgut, taking care to pass it under the whole bleeding surface; five or six points are necessary. The same manœuvre on the posterior cervical lip, after removal of the fixing forceps, using the first sutures to depress the organ. Suture

of the commissures by one or two points. Cutting of the threads, vaginal irrigation, uterus restored to its place, iodoform tampon (Fig. 122, A, B).

At the end of three days the tampon may be withdrawn, and antiseptic irrigation practised morning and evening (1:2,000 bichloride). It is necessaray to keep the patient in bed during at least five days; union is then complete; there is no need of removing the sutures, which fall of themselves.

This operation is easier of execution than Hegar's, which differs in the absence of the first step, the incision of the commissures; as to the method of Sims, where the vaginal mucous membrane alone is sutured above the wound, that was considered an improvement when it appeared, but it is now superseded.

Amputation of the Cervix with Single Flap. Excision of the Mucous Membrane. Schroeder's Operation.—This is especially ap-

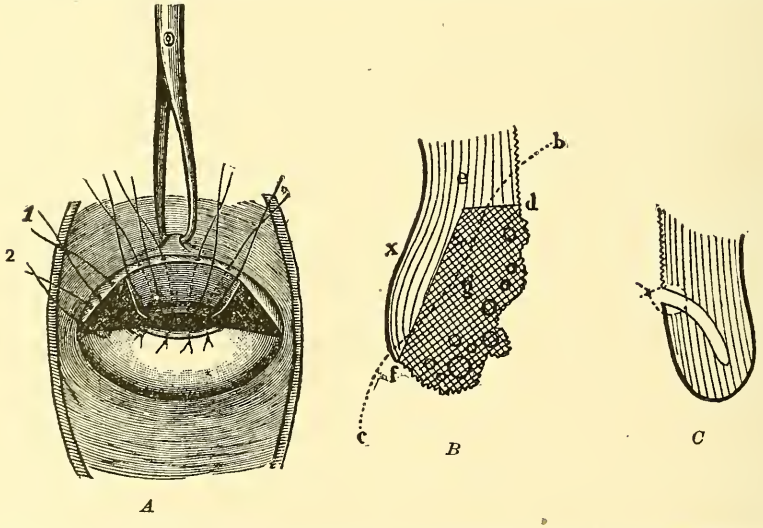


Fig. 123.—Amputation of the Cervix by one Flap or Excision of the Mucosa (Schroeder's Operation). *A*, Showing method of placing the sutures; 1 and 2 are those uniting the commissures; *B*, section showing shape of incisions and (*b c*) line of suture; *C*, shows position of lips after suturing.

plicable to the catarrhal form, where there is rebellious ulceration and follicular degeneration more or less deep; but it may be adopted in any chronic metritis where from the shape or consistence of the cervix it is more convenient.

This operation of Schröder's[45] is coming rapidly into favor elsewhere, and is beginning to be adopted in France, where I was one of the first to practise it.[46]

Its execution is a little more difficult than the preceding. The cervix is made accessible and the bilateral incision made as above; from that we proceed as follows: Transverse incision of the internal mucosa and semicircular incision of the external, forming thus a layer of tissue which is dissected from without till the internal transverse incision is reached and the layer is wholly detached; the thickness of this varies according to the alteration of the tissue. Infolding, entropion, of the lip thus formed and suture internally by five or six points with catgut, the needle being passed below the whole bleeding surface; two or three auxiliary sutures superficially placed. The same dissection and suture of the posterior lip, the cervix being held firm by the threads already passed. Suture of the commissures, etc., as above (Fig. 123).

At times there may be an advantage in making the twofold incision on one of the cervical lips and the single one on the other. It is well also to precede the operation by a curetting of the body where the mucous membrane is always somewhat altered. I prefer to do this after the amputation, so as not to be disturbed by the bleeding, and to operate on the part while it is not shrivelled by the perchloride.

Emmet's Operation.[47] *Trachelorrhaphy.*—As I have said, this should yield to Schröder's operation whenever with cervical laceration there is also cervical catarrh. Emmet's operation, then, should be saved for chronic metritis without erosion of the cervix. One might then hope, by removing cicatricial tissue and restoring the normal shape of the part, to cause the disappearance of the pains and irritation; all the more, because the trauma of the cervix usually promotes involution of the body of the uterus, an important factor in the success obtained.[48]

The patient is anæsthetized and the assistants are disposed as before; the cervix is seized with forceps (in America a thread passed through each lip is preferred); one forceps catches the anterior lip close to the laceration, the other is placed opposite, symmetrically; then the borders of the laceration are dissected out in a single piece, being careful to reach the depth of the angle and to remove all the cicatricial tissue (Emmet). The wound is then equalized, if necessary, by curved scissors. The first suture is then passed with a strong curved needle near the angle of the wound, piercing the thickness of both sides two mm. from the external surface and one mm. from the internal, and each suture is tied at once to secure perfect coapta-

tion of the parts. Four to eight sutures are thus passed. I use catgut, which has the advantage of falling out by itself; two sizes should be employed, the smaller for any superficial sutures which may be necessary.

Lately, under the influence of Lawson Tait, there has been a reaction against any loss of substance in plastic operations. Applying the principle of the flap-splitting operations to trachelorrhaphy, Sänger[49] and Fritsch advise the following: Excision of the superior angle, then partial splitting of the lips of the laceration by an incision

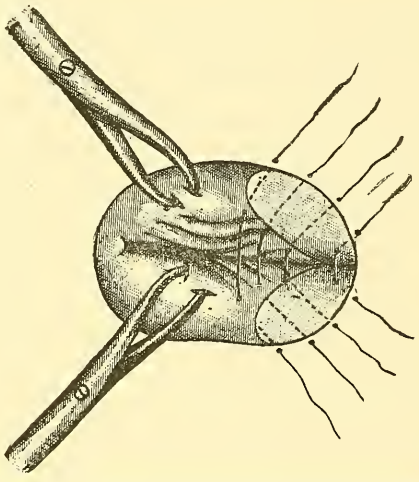


FIG. 124.—EMMET'S OPERATION. [This cut shows the common fault of insufficient denudation.]

from above downward, and suture at the external surface alone. An iodoform tampon left in place three days is all the dressing needed. After this, antiseptic vaginal irrigation morning and evening, and rest in bed for two weeks.

When the laceration is bilateral it is almost impossible, in doing a trachelorrhaphy on both sides, to avoid narrowing the cervical canal I therefore prefer Schröder's operation, which is in these conditions more expeditious and permits thorough removal of the sclerosed tissue.

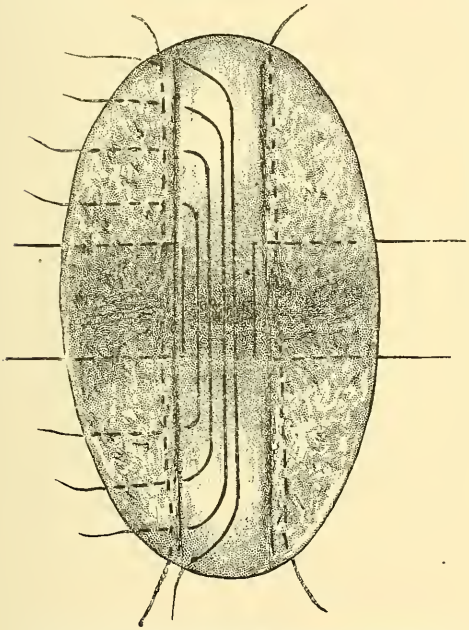
After any procedure of this kind it is well to explore the cavity of the uterus with a curette, and, if anything soft and friable is found, to do a complementary curettage, which does not complicate the principal operation.

There are few operations which have had such passionate partisans and detractors as trachelorrhaphy. While certain authors have

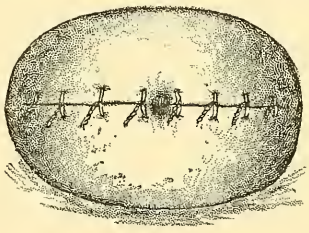
accused it of producing sterility and of complicating labor,[50] others have extolled it as a remedy against this very sterility,[51] while some have not hesitated to do it on pregnant women, demonstrating at least by their boldness the harmless nature of the procedure.[52]

To me it seems certain that the operation, well done, need have no bad results, though it has no advantages; it is probably often done unnecessarily.

[I cannot agree with the author in his statements concerning Emmet's operation which, while in most instances it removes hyperplastic tissue as effectually as the methods favored, has the manifest advantage of restoring the cervix to its natural ante-partum condition instead of mutilating it by what is practically an amputation. Each method has its own indications, and trachelorrhaphy is to be reserved for cases with deep cervical tears with more or less glandular or parenchymatous hyperplasia and endometritis, or with symptoms dependent on nervous reflexes. If the degree of thickening and hyperplasia is not marked, as in somewhat recent cases, the typical operation as shown in Fig. 125 will be sufficient; care being taken to denude thoroughly, removing all the diseased tissue, and to unite the surfaces accurately; denudation and union of the edges only, as shown in the author's diagram (Fig. 124), being crefully avoided.



[Fig. 125.—Diagram Showing Area of Denudation and Arrangement of Sutures in Emmet's Operation (Trachelorrhaphy).]



[Fig. 126.—Appearance of Cervix after Sutures are Tied.]

In cases with great hyperplasia more tissue must be removed, so that the operation then resembles in its first steps that of Schröder,

and becomes practically a flap amputation. The sutures may be inserted in the same manner as at first, with the addition of a plug of glass, hard rubber, or drainage tube long enough to reach to the internal os, which is laid in the line of the cervical canal, fastened by a suture, and left *in situ* until healing is complete.

Denudation may be accomplished by scissors or scalpel, the patient being in the Sims or lithotomy position, the cervix being steadied by tenaculum, and excessive downward traction being avoided. Sutures may be of silver wire (No. 27), which I prefer, or of silk-worm gut, silk, or chromicized or juniper catgut. They may be removed in ten days, the patient getting up about the fourteenth. Careful antisepsis.]

The various plastic operations on the cervix, amputation, resection, suture of lacerations, do not diminish the dilatability of the part, for they heal by primary cicatrization without the formation of inelastic tissue. Many observations agree on this theoretic point, and prove that there is no need to fear sterility or dystocia.[53]

Is castration a legitimate operation in metritis? I do not hesitate to answer in the negative. Castration owes its unquestionable success, not so much to the fact that it was done for disease of the uterus as for characteristic alterations in the adnexa (peri-oöphoritis, perisalpingitis[54]), in cases of old or badly treated metritis. In such cases the metritis occupies the second place, and the treatment relates more especially to the complication which has become the principal disease. But to practise a castration with removal of both ovaries and tubes on the sole indication of excessive pain during the menses, to establish thus an artificial menopause,[55] seems to be too extended an application of the operation. In a number of the reported cases all the measures of conservative surgery do not appear to have been exhausted before reaching an operation which, if legitimate, is hardly indispensable.

Péan[56] has often performed vaginal hysterectomy, which he calls uterine castration, for painful metritis accompanied, as he says, by the morbid state described as utero-ovarian neuralgia, which has resisted all medication. In such cases he has seen ovarian castration by itself permit the pains to continue, as if the uterus were a centre from which reflexes started independent of those which take their birth in the adnexa. On the contrary, where he has removed the uterus and left the adnexa, the results have been more satisfactory. Péan, then, desires to substitute vaginal hysterectomy for Battey's

operation in cases of chronic and painful inflammation of the utero-ovarian apparatus; he recognizes that after ablation of the uterus, however, one may be obliged to open the abdomen to remove the altered adnexa, which are difficult to reach by way of the vagina. It does not seem to me proven that the secondary operation has not a right to precede the principal one, which it has often rendered needless. Vaginal hysterectomy has been performed many times by other surgeons for rebellious hemorrhagic or painful metritis; and it has certainly been abused. The most recent researches demonstrate that every hypertrophic glandular metritis which has resisted curetting for many months shows thereby its tendency to become an epithelioma. These growths are styled adenoma in Germany, and form the transition between hyperplasia (benign adenoma) and cancer (malignant adenoma). Exploration by the curette is not always sufficient to remove doubt,[57] for we are not able thus to examine the glands in all their depth.[58] We must in such a case give the most weight to the clinical signs; in any case we may well be cautious about operating for a cancerous tendency in metritis when there is no actual degeneration present.

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CHAPTER VIII.

UTERINE FIBROMATA.

Pathology.—To those tumors of the uterus which have the same structure as the uterus itself, the names of fibrous body, fibrous tumor, myoma, fibro-leiomyoma, fibroid (English authors), and hysteroma (P. Broca) have been given. They are usually benign, that is to say, incapable of becoming general and infecting the organism: but, while the greater number of them may exist unnoticed, causing only a

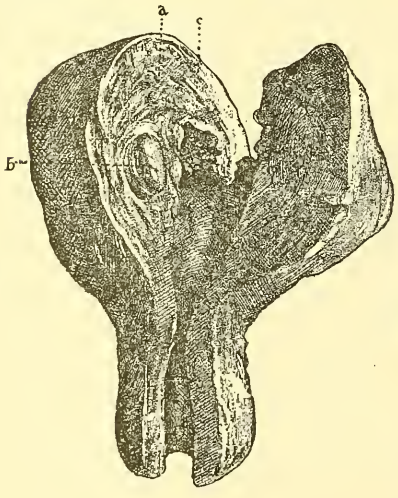

FIG. 127.—SMALL INTERSTITIAL FIBROID. *a*, Hypertrophied uterine wall; *b*, fibroid; *c*, uterine mucosa showing the lesions of endometritis with polypoid vegetations.

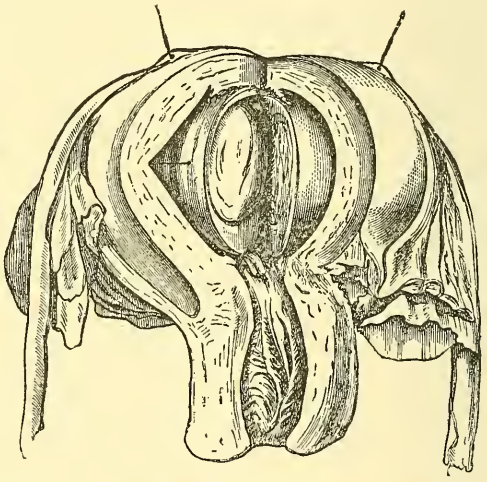

FIG. 128.—SUBMUCOUS PEDICULATED FIBROID.

hidden deformity or a slight infirmity, there are many which are of more serious import, and which may lead to conditions resulting in death.

Histogeny.—Velpeau, and after him a number of others, attributed the development of fibromata to the presence of a blood clot in the uterine tissue.[1] The spontaneous organization of coagula after ligation of arteries suggested the idea that the same process might result

in the formation of these neoplasms. But experimental study has demonstrated that this organization of coagula is nothing but an ingrowth of the elements of the vessel wall, and thus this edifice of theory, founded on lack of observation, collapses altogether.

Klebs[2] asserts that these fibrous tumors have their origin in a proliferation of the connective tissue and the muscular layers of certain vessels; the different nodules thus formed become aggregated to make one tumor. Kleinwächter describes the evolution of fibromata as due

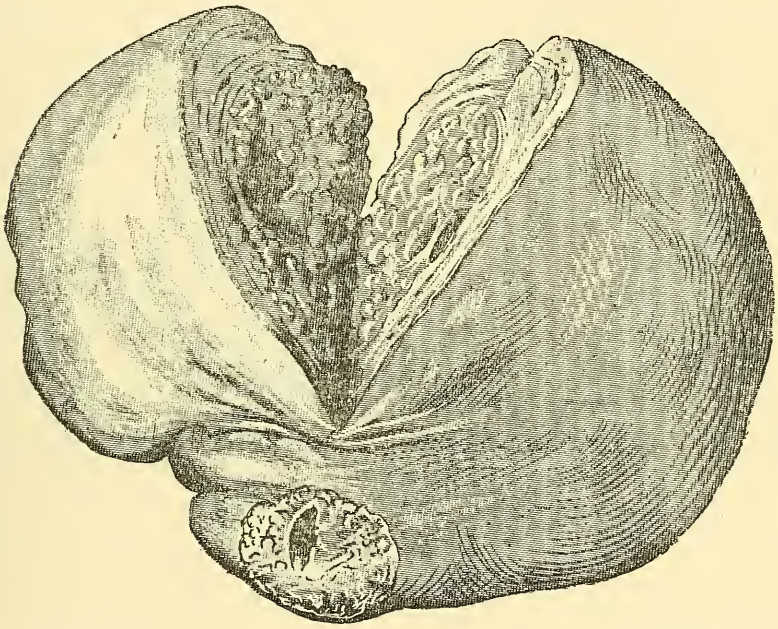

Fig. 129.—Submucous Œdematous Fibroid with Hypertrophy of Uterine Wall.

to a round cell which is found along the capillaries and produces a partial obliteration of them;[3] these cells then become fusiform and produce the nodules. In other words, our knowledge of the subject is still very imperfect.

These neoplasms are very frequent; according to Bayle, who described certain anatomical features of them in 1813,[4] a fifth of all women over thirty-five have fibromata.

The number is very variable; certain uteri present an enormous number of interstitial or pediculated nodules. Most frequently there are three or four distinct tumors; at other times there is but one. Though clinically there may appear to be but one, not rarely there is another in the thickness or on the surface of the organ,

which either may remain latent indefinitely or may finally develop; this fact is often demonstrated at laparatomies.

These tumors may reach very large proportions, and then often become fibro-cysts. Stockard found one, in a negress,[5] that was colossal, weighing one hundred and thirty-five pounds. Even the solid tumors may be as large. Hunter,[6] of New York, recently observed one that weighed one hundred and forty pounds, while the cadaver after its removal weighed but ninety-five.

The body of the uterus is more often affected than the cervix. The tumor's position relative to the uterine tissues permit us to distinguish the following varieties:

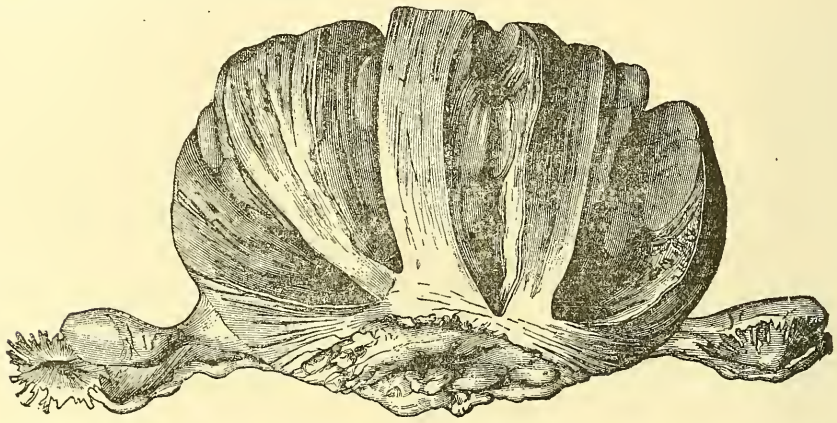

FIG. 150.—SUBPERITONEAL AND INTERSTITIAL FIBROIDS OF THE FUNDUS OF THE UTERUS. (The incisions are to show the multiple nodules.)

1. Interstitial, in the thickness of the (usually hypertrophied) muscular parenchyma.

2. Submucous, immediately or nearly below the mucous membrane.

3. Polypoid, or pediculated, hanging from the mucous membrane by a stem or fold of the mucosa, with muscular fibres and vessels.

4. Subperitoneal, external to the muscular tissue, with a broad base or with a narrow pedicle; it is well not to speak of these as polyps, even though they may resemble them, but to keep that name for those which are found within the cavity of the organ. An important sub-variety is the intra-ligamentous, developing in the thickness of the broad ligament, which will be described with tumors of the cervix.

Whatever may be the seat of the fibroma, it provokes a constant but varying degree of uterine hypertrophy.

The muscular wall increases in such a way as to encapsulate a number of tumors as a single mass; the muscular layers then resemble those of the gravid uterus, often being continued far into the broad ligaments, which become thickened and fleshy.[7] A large vascular development generally accompanies this hypertrophy.

The increase in the volume of the uterus, caused by the continual congestion of which the neoplasm is the focus, might be compared to that which occurs in the first months after fecundation; for which reason the name fibrous pregnancy (grossesse fibreuse) has been pro-

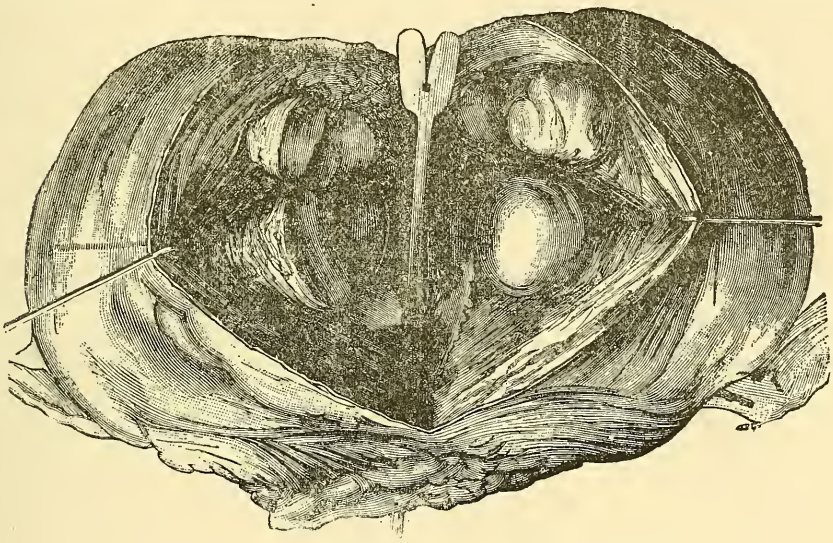

FIG. 131.—INTERSTITIAL FIBROID OF THE BODY OF THE UTERUS.

posed by Guyon to designate the fact.[8] Even small fibromata are sufficient to produce the condition (Fig. 127). The uterine cavity is found much enlarged by the eccentric hypertrophy, and also, in part, by the traction of the mass which hangs from the fundus of the organ.

Fibromata of the Cervix.—Fibrous tumors of the cervix deserve a special paragraph; they are found in the same positions and could be classified as other fibroids; but the division of the cervix into two distinct regions, the supra- and the sub-vaginal, makes another classification necessary.

A. Fibromata of the External Os.—Whether submucous or interstitial, they give to the lip involved a cylindrical and elongated form (Fig. 134). The submucous tumors of the cervical canal occasionally take on a peculiar polypoid form, of which I have observed examples.

They descend into the vaginal canal in the form of slender stalactites or like the drops from a torch, forming a kind of sheaf which appears at the external os and is attached by a circular or semicircular base

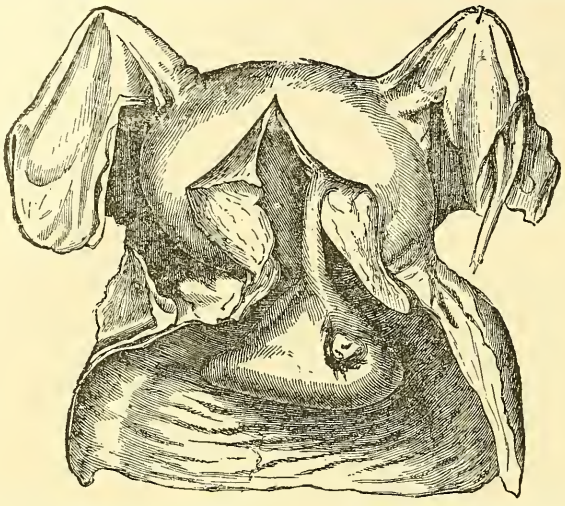

Fig. 132.—Uterine Polyp Expelled into the Vagina but Preserving the Triangular Form of the Uterine Cavity.

at the level of the isthmus or often much lower; I have seen a submucous cervical fibroma make a projection in the interior of the dilated cervix like a plaited collar round the internal orifice. At

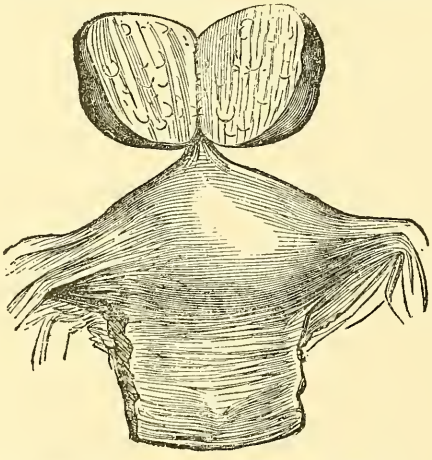

Fig. 133.—Subperitoneal Pediculated Fibroid.

other times these little polypi contain a layer of glandular tissue, newly formed, and have a papillary or mulberry appearance[9] (Fig. 135).

Exceptionally a fibroma within the uterine wall may descend into one of the lips of the cervix by a kind of splitting process.[10]

B. Fibromata of the Sub-vaginal Portion.—The only forms in this class which deserve special mention are those which are developed from the external surface of the region, and so find themselves at once between the layers of the pelvic floor. They usually develop behind the cervix, raise the pouch of Douglas, and come into contact with the posterior wall of the vagina and the rectum. They often pass between the layers of the broad ligament, constituting one of the most dangerous of the intra-ligamentous varieties. They may even exceed these limits, crowding in anteriorly between the bladder and the uterus, and pushing prolongations as far as the iliac meso-colon. Imprisoned by their attachments in the narrow inclosure of the bony pelvis,

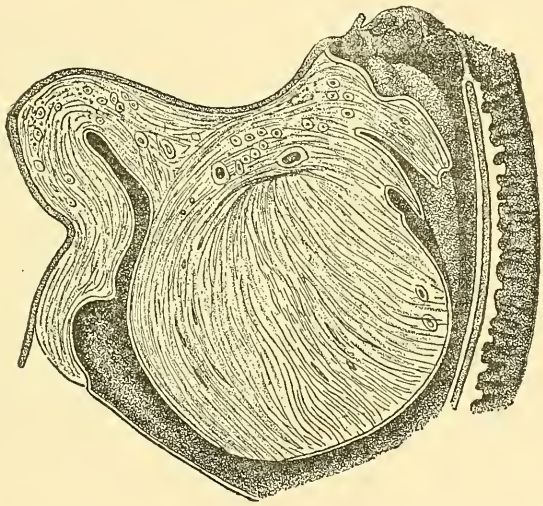

FIG. 134.—INTERSTITIAL FIBROID OF THE POSTERIOR LIP OF THE CERVIX.

which is itself inextensible, they give rise to the most serious symptoms by compression; I have proposed to name them "pelvic fibromata." [11]

Connection of Fibrous Tumors with the Uterine Tissue.—Fibrous tumors have usually an investment of loose cellular tissue which forms a capsule, out of which they can be shelled without much effort. This arrangement is at times so well marked that, as soon as the capsule is incised, the tumor projects strongly, under the influence of the muscular contraction; but more often the fibroma, instead of being encased in the uterine parenchyma like a foreign body, is held in place by the fibrous bands, more or less dense, by which its vascular connections are established. There are also rare cases where there is no more demarcation between tumor and uterus

than a local thickening at its periphery. In general, the softer the tumor the fewer its connections with the neighboring tissues.

Structure and Texture.—To the naked eye, uterine fibromata are formed of dense tissue, shiny or rosy white, elastic, giving a very clean surface on section, sometimes unequally convex, as if the middle portions were compressed by the superficial layers, generally more closely packed. One can at times distinguish on the surface, with the aid of a glass, the intercrossing loops of fibres and the vortices, which look as if the fibres were rolled about many different axes (Fig. 137).

The vessels are relatively few; but in tumors of great size we do see them, superficially, under the peritoneum or in the capsule, and I

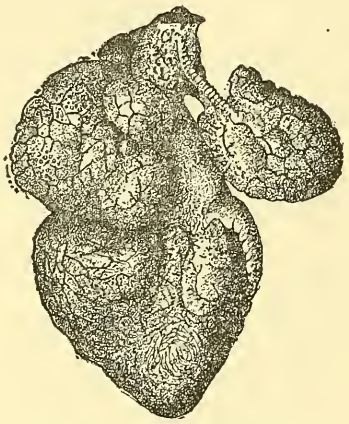

Fig. 135.—Small Muriform Polyp of the Cervix. (Papillary fibroma with glandular hypertrophy. Ackermann.)

have observed in one case a vessel of the broad ligament which was as large as the brachial and had given a loud bruit with a thrill. The peripheral veins then are of the size of the jugular, adherent on all sides to the muscular bundles, which hold them wide open. When this arrangement is very well marked and the tumor is hollowed by vascular lacunæ, due to the dilatation of the capillaries, we have the form which Virchow[12] calls "teleangiectatic myoma," or "myoma cavernosum"; the portions thus degenerated resemble a sponge soaked in blood.

In polypi the pedicle sometimes contains large arteries.[13] They present, however, a thickness of their walls and a contractility which, joined to the elasticity of the pedicle itself, secure a rapid, spontaneous hæmostatic action as soon as they are cut off. The spaces

which separate the different layers are considered by Klebs to be lymph channels.

Nerves have been followed into these tumors by Astruc and Dupuytren; Bidder has demonstrated them anew, and Hertz has described their mode of termination in the nuclei of the smooth muscular fibres.[14] On microscopic section fibromata present smooth muscular fibres and connective tissue in varying proportion. According to Ch. Robin, the muscular fibres are always in the minority, perhaps as high as half and at times as low as one-tenth.[15] As one or the other predominates, the tumor is called a fibroma, a myoma, or a fibromyoma. These terms are not exact but relative, for almost always

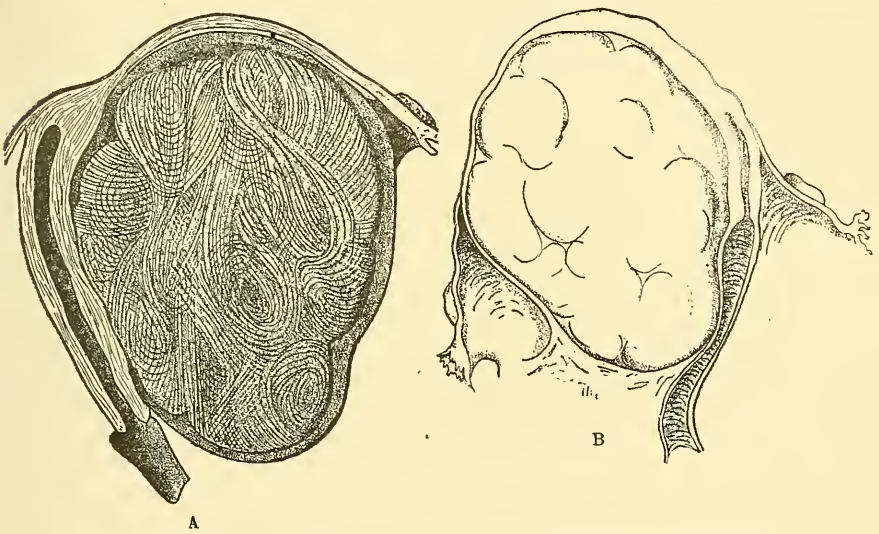

FIG. 136.—INTRA-LIGAMENTOUS FIBROMA. *A*, Abdominal variety; *B*, pelvic variety.

the two elements are mixed. Gusserow[16] proposes to distinguish them as hard, where the connective tissue is in excess, and soft, composed chiefly of muscular fibres; the latter form is seldom entirely encapsuled and is more vascular. On section we see the fibres cut transversely, obliquely, or longitudinally. The first are easily distinguished by the fusiform aspect of their elements and the characteristic nuclei which look on cross section like a mosaic; this appearance must not be confounded with that of round cells. Between the bundles there are fibrous layers of unequal thickness which cross in all directions; they are partly connective tissue, poor in cells, and partly fusiform bodies prolonged longitudinally (Fig. 138).

Connections with Neighboring Organs.—When a fibroma with a broad base grows from some free portion of the uterus (fundus, anterior or posterior surface), it extends into the abdominal cavity above the superior strait and floats among the intestines; the uterus is then drawn upward, the cervix is thinned and elongated.

If its point of attachment is narrow, the tumor may fall backward into the pouch of Douglas and become fixed. When it is of large size and not bound down by adhesions, it jolts about in the abdomen, irritating the peritoneum till it provokes an exudation, at times liquid, at times plastic, which forms adhesions. This ascites is generally abundant and of a yellow color, rarely tinged with blood, except with malignant tumors. A form of ascites has been observed

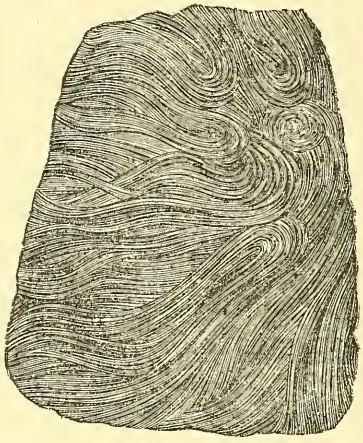

FIG. 137.—UTERINE FIBROID. Section showing the disposition of the fibres to the naked eye.

to which the name "chylous" has been given; it is probably due to a transformation to fatty granules of a fibrinous exudation.[17]

Adhesions when present are usually with the great omentum or the intestine; a loop of the gut may be so fused with the surface of a fibroma as to defy all dissection. These adhesions become then the principal source of derangement of nutrition, and the pedicle may become so thin that the tumor ceases to grow. It may even break off and leave the fibroma independent of the uterus and grafted on some part of the pelvic circumference. Huguier[18] and Nelaton[19] have reported cases of this kind. Depaul[20] found a fibroma entirely free in the cul-de-sac of Douglas; such a case may be explained by the rupture of the pedicle with absence of adhesions.

Elongation or torsion of the pedicle may cause various changes in the nutrition of the tumor, with consecutive degenerations.

Alterations and Degenerations.—At the menopause most of the fibromata undergo a progressive induration; at the same time they diminish in volume and the uterus may present a senile involution and atrophy; the tumor still persists, but without causing any morbid reaction: this is the condition of most of these tumors, not recognized during life and found for the first time at the autopsy of aged women.

Calcification is an unusual change. It is not an ossification, as the older authors thought; the deposits of carbonate of lime are found toward the middle of the tumor, sometimes partially, sometimes completely converting it into a uterine stone.[21] We observe this but rarely in the pedicled subserous form or in polypi, which may then be-

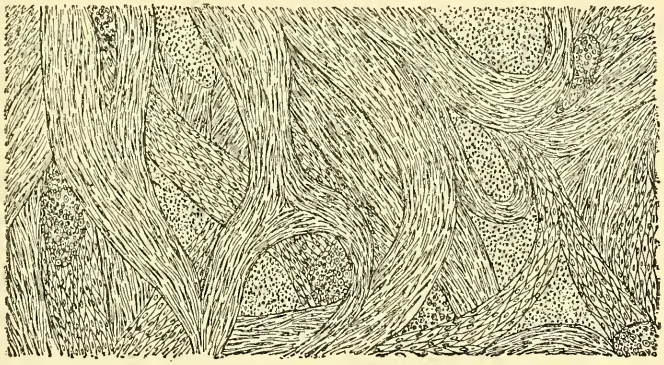

FIG. 138.—UTERINE FIBRO-MYOMA. Microscopic view.

come free and be expelled spontaneously. This fact has been known since the days of Hippocrates, and the Academy of Surgery has collected a number of such cases.[22]

Softening may result from various causes. During pregnancy the tumors acquire a considerable volume, sharing in the exaggerated nutrition of the uterus. Thus swollen with juices they are usually very soft;[23] after labor and by a process attributed a little hypothetically to a fatty degeneration, they may gradually disappear, taking part in the uterine involution. Different authors have cited many cases of this regression, and I have observed it in one very remarkable instance; the pregnancy, intervening during a thermal treatment for a large fibroma, had doubled the size of the tumor; the labor took place without accident, and the fibroma disappeared completely, leaving no traces.

The fatty degeneration, as so justly remarked by Gusserow, has

never been proven by the microscope, except in two cases, where there was no diminution in the size of the tumor as the result.[24] Amyloid degeneration has been found in one instacne by Stratz, a unique case up to the present.[25] Œdema, which is often the first stage of gangrene, may be the cause of the softening.

Colloid or myxomatous degeneration, according to Virchow,[26] is characterized by the effusion of a mucous fluid between the muscular bands; it is distinguished from simple œdema by the presence of the mucin and the proliferation of nuclei and small round cells in the interstitial tissue. The formation of fibro-cystic tumors may succeed these degenerations[27] when the bands which separate the small cells from the œdema are destroyed. There are no distinct walls in these cysts, as they are formed simply from the lacunæ of the tumor tissue.

Other fibro-cystic tumors have a very different origin and belong in a special pathological class. These cysts are formed in pre-existing cavities, in dilated lymph spaces comparable to the similar dilatations which the blood-vessels may present. The fluid which they contain is limpid and coagulates on contact with the air. Leopold has termed these tumors "lymphangiectatic myomata."[28] It must be noted that this lymphatic origin of certain cystic tumors of the uterus had already been clearly formulated by Koeberlé.[29] Their formation seems to be due to the development of part of the tumor along the path of the lymph-vessels contained in the broad ligament. On the internal surface of such tumors we can demonstrate an epithelial investment which distinguishes them from simple cavities formed from softening of the neoplasm or apoplexy into its substance. There are also mixed forms in part vascular and in part lymphatic.[30]

We must be careful not to confound these tumors of the uterus with either the intra-ligamentous ovarian cysts, which are very adherent to that organ, or with the serous accumulations found at times in foci of peritonitis about the uterus; the mistake seems to have been more than once committed. Certain forms of pseudo-cysts are produced in the foci of molecular fatty disintegration at the centres of large tumors where the nutrition is impeded. There can be no gangrene because of the absence of germs; it is then a necrobiosis, with the formation of soft masses, which later may fall into deliquescence and fill the cavity with more or less dense fluid. Hemorrhages are often added to dilute the contents of the cyst and increase their size.[31] These have been known to rupture into the uterus. In certain of these rare cases, the uterine orifice may be obliterated by the elonga-

tion of the cervix, the partial rotation of the organ, and a certain degree of inflammation, and thus is formed a peculiar form of hæmatometra. W. A. Meredith has reported a remarkable case of this condition which was cured by supra-vaginal hysterectomy; the morbid mass weighed fifteen pounds and contained five pounds of blood.[32] Dubreuil[33] has punctured and drained, in a woman of sixty-five years, an hæmatometra that simulated a fibro-cyst, due to obliteration of

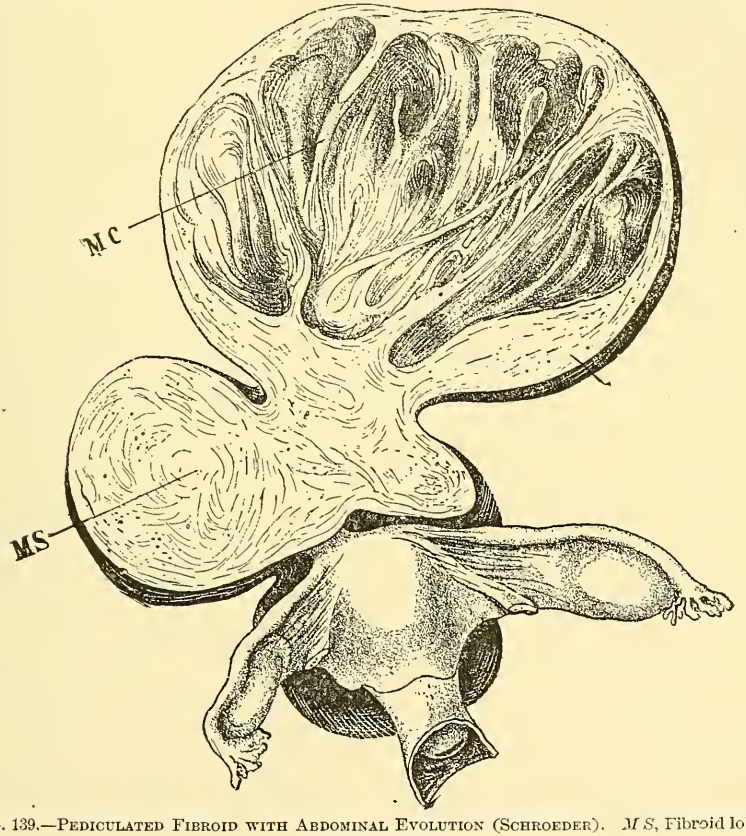

FIG. 139.—PEDICULATED FIBROID WITH ABDOMINAL EVOLUTION (SCHROEDER). *M S*, Fibroid lobe; *M C*, Fibro-cystic lobe.

the neck of the uterus containing a fibroma; this incomplete operation was followed by death. Tillaux[34] has published under the name "cystic uterus" an analogous case, which was cured by abdominal hysterectomy. These cases are usually found in aged patients, where the cervix has a tendency to become retracted and obliterated under the influence of senile atrophy.

It is evident, then, that from an anatomical point of view these

tumors do not form a natural group of myo- and fibro-cysts; for they may take their origin from: 1st, closed spaces, resulting in dilatation of the lymphatics, or lymphangiectasis (Koeberlé, Leopold); 2d, œdematous (Oscar, Schröder) or myxomatous infiltrations (Virchow), in their highest development; 3d, lacunæ (geodes) formed at the centre of myomatous or sarcomatous tumors by disintegration of their tissue. Apoplectic foci may complicate either of these different varieties.

Inflammation; Suppuration; Gangrene.—It is probable that the starting-point for inflammation in fibrous tumors is always a mortification, more or less extended, which infects the capsule and sets up a suppuration in the zone where the tissue is both more lax and more vascular. This initial mortification may be due to surgical interference, which has opened the seat of the fibroma with a therapeutic object, or to an infection from outside following septic exploration (dilatation, sounding, etc.); or, finally, it may come from compression and obliteration of the nutritive vessels of the tumor, with chafing of the mucous membrane which covers and protects it against the entrance of germs. The latter mode of origin is especially frequent in polypi. If it is true that a mortification of a small part of the tumor, interstitial or submucous, precedes inflammation and suppuration, it is due, on the other hand, to the agency of this, in its turn, that the whole mass becomes gangrenous, and separates, by an actual dissection, from the adjacent tissues.

The sphacelated portions are eliminated spontaneously or by the aid of art; or they may produce a putrid infection. The pus may spread itself out in the pelvic cellular tissue. G. Braun[35] reports a case where the pus, after distending the uterine cavity, discharged by the external os and also through the inguinal region. Orthmann[36] performed an unsuccessful laparatomy on a woman in whom a suppurating fibroma had perforated the posterior uterine wall and caused peritonitis.

Cancerous Degeneration.—Can a carcinoma arise from a fibroma? Simpson maintained that the irritation produced by a fibroma invited the formation of malignant neoplasm; to-day we express the same idea by saying that its presence constitutes a *locus minoris resistentiæ*, producing the local determination of the diathesis. Recent researches allow us to form a definite idea of the process. It is probable[37] that in certain cases it is the chronic inflammation which involves the mucous membrane and is the constant accompaniment of fibromata,

which first causes a proliferation of the glands; this, at the beginning of a typical form (adenoma), passes to the atypical and becomes epitheliomatous. E. Wahrendorff[38] collected in Schroeder's clinic four such cases which seem conclusive. A second way in which cancer may arise from a fibroma is by sarcomatous degeneration of the framework of the tumor, which is little by little infiltrated with round cells until the muscular fibres disappear. It is also possible that these myo-sarcomata undergo a cystic transformation, either by softening and hemorrhages or by distention of the lymph spaces. There is then a sarcomatous variety of fibro-cyst.

As to the degeneration of a fibroma into carcinoma, it is evident from Gusserow's inquiry into the subject that it is far from being demonstrated. The observations cited to prove the point have to do generally with cancer invading the uterus by the side of a fibroma, which is a very different thing from the pathological and pathogenic standpoint, however much like it it may be clinically. C. Liebmann[39] has lately published a case where it seems certain; there was also cancer of both ovaries.

The association of cancer of the cervix with fibroma of the body is not infrequent.

Adjacent and Distant Lesions.—Wyder[40] and Von Campe have shown that in almost all cases of fibroma there is present also an endometritis: the mucous membrane of the uterus suffers a glandular or interstitial hyperplasia. Wyder[41] has observed that the former is found almost exclusively where the tumor is at a distance from the uterine cavity, and the interstitial occurs with those but little removed from the mucous membrane; occasionally we encounter a mixed form, which Olshausen calls "endometritis fungosa." These lesions explain the symptomatic hemorrhages of fibromata.

It is certain also that there exists in some cases an endosalpingitis by propagation; for at times, in hysterectomies and castration for fibroma, the tubes are found flexuous and full of blood. Röse,[42] in the course of a myomotomy, discovered one of these hæmatomata of the tube, which was so thinned that rupture seemed imminent, and he cites this condition among the indications for operation.

Bantock[43] finds that in patients with uterine fibroma the liver is fatty, and attributes the lesion to the presence of the tumor; he believes it to be a frequent cause of unsuccessful operation. Fibrous uterine tumors, by pressure on the ureters, may produce grave kidney disorders—pyelitis, pyelonephritis, hydronephrosis.[44] These accidents

are especially frequent when the tumor has a pelvic development; I will describe them with cancer.

Lesions of the heart, which may be found in all cases of large abdominal [45] tumor, are very often a complication of uterine fibroma. They seem at times dependent upon renal changes, as Traube has indicated, but often we cannot find any such correlation. The hypertrophy, with or without dilatation of the cavities or consecutive change in the cardiac tissue, produces itself, no doubt, by a pathogeny similar to that which causes the hypertrophy in pregnancy. As to the final degeneration of the heart, it is strongly favored by the anæmic and cachectic condition of certain subjects; two such forms of degeneration are described, the fatty and brown atrophy of the myocardium (Hofmeier). Sebileau [46] has very recently called attention to the troubles caused by hypertrophy and dilatation of the left side of the heart, more rarely of the right, in voluminous tumors of the abdomen.

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CHAPTER IX.

SYMPTOMS, DIAGNOSIS, AND ETIOLOGY OF UTERINE FIBROMATA.

The symptoms of fibroma of the uterus are of two kinds: 1st, the rational signs, which reproduce the uterine syndroma described in Chapter VI., with certain special differences and a predominance of the hemorrhage; 2d, the physical signs proper to the tumor.

1. *Rational Signs.*—The completeness of my description of the uterine syndroma permits me to abridge this section. The hemorrhages appear in a peculiar form and become the chief symptom in the majority of these cases. They occur either as metrorrhagia or as menorrhagia; that is, they come at the regular period of menstruation or during the intervals. They are intimately connected with the lesion of interstitial metritis, which always accompanies fibroma situated at but little distance from the mucous membrane; the glandular metritis which is found with tumors farther removed from the uterine cavity gives rise only to leucorrhœa. In general the symptom of bleeding is more complained of the more the neoplasm invades the cavity and reaches its highest grade in polypi. The loss of blood is very enfeebling to the patient, but death by hemorrhage is exceptional: Duncan has reported one such case where at the autopsy a rupture of a large uterine sinus [1] was found.

The leucorrhœa is not distinctive; at times there may be very abundant serous discharges, a hydrorrhœa, which differs from that of cancer in having no odor and in being intermittent.

The pains are various. There is usually only a sensation of dragging and weight, with reflex neuralgias in the lumbar region and abdomen, as is so common in any uterine affection. To these are joined, when the tumor projects into the uterine cavity, colic and expulsive pains occurring at the time of the hemorrhages. When the tumor is very large, it may press upon the sacral plexus and cause extreme sciatic pain,[2] which is apt to be more violent at the menstrual period. Jude Hue [3] observed one case of this kind where the support of an air pessary caused the sciatica to disappear.

The symptoms of vesical compression are very frequent; West

found dysuria in thirty-five cases out of eighty-six, but Gallard did not regard this as simply a mechanical trouble, although he gave no explanation of its production.[4] It is probable that this dysuria is due to small tumors on the anterior face of the uterus in direct relation with the neck of the bladder.[5] All these visceral symptoms are more pronounced during the periodical congestion of menstruation, and they may at times acquire the importance of a cystitis from the permanent presence of residual urine or from infection introduced by the catheter when proper precautions are not observed. The compression of the vesical neck may produce a chronic distention which simulates ovarian cyst.[6]

The compression of the rectum, more rare than the preceding, may at times cause hemorrhoids, and with the dyspepsia will produce constipation. Barnes[7] attributes great importance to the absorption of excrementitious matters which follows this obstinate constipation, and considers it a veritable toxæmia, which he proposes to call copræmia; recent researches on the ptomaines and leucomaines give a certain weight to this opinion, which seemed a very bold one when it was first formulated.

Fibromata which are contained within the lesser pelvis may cause internal strangulation and death.[8]

Compression of the ureters and grave renal troubles have been known since Murphy's description of them;[9] since which time there have been numerous observations of this kind scattered through the literature of the subject. I have collected some of these and shown that the risk of this serious complication, wrongly considered rare by Gallard[10] as by most other authors, should on the contrary be one of the most serious indications for operation.[11]

A very great number of the deaths following hysterectomy or castration must be attributed to renal degeneration, by reason of which the surgical interference and the long inhalation of the anæsthetic are invested with great and sudden gravity. (See[12] reports a case of pregnancy at four and one-half months with three fibromata, of the size of an apple, compressing the bladder; the fundus imprisoned, the cervix above the symphysis; unsuccessful attempts to disengage; death; and at the autopsy, pyelo-nephritis. Skene, on this occasion, said that it was the third fatal case of pyelo-nephritis which he had seen from pressure on the vesical neck, and that such cases were probably more frequent than was supposed. Salin and Wallis[13] report a case of castration, with death, from double hydronephrosis, due to a large

uterine myoma in a woman of forty years, who had always suffered great pain in the dorsal decubitus. The castration was followed by suppression and death in seven days, with the symptoms of uræmia and a little albumin in the urine. At the autopsy the ureters were found compressed and thickened, their pelves dilated). On the other hand, symptoms of pyelitis,[14] and of albuminuria with threatening uræmia,[15] have been seen to disappear after the removal of a fibroma which compressed the ureters. We must never neglect to examine the urine, both chemically and by the microscope, and determine the proportion of urea, the presence of albumin or pus, and the characteristic hyaline and granular casts.

Every abdominal tumor causes an increased vascular pressure, and so reacts upon the cardiac muscle. It is not therefore astonishing that any heart lesion, although slight, may be aggravated by the presence of a fibroid; for a similar effect is produced by pregnancy.[16] A part of the cardiac trouble observed in patients with voluminous tumors of this kind may then be due to this origin; but the complication is far too frequent to be always explicable in such a way. Only a few isolated observations have been published,[17] since Hofmeier,[18] in 1884, in an article remarkable for its physiological and pathological explanation of shock, insisted on the frequency of cardiac disease in cases of abdominal tumor, and especially with fibromata of large size. He collected a series of eighteen cases where sudden death was caused by cardiac failure provoked by the presence of a large abdominal tumor, either physiological or pathological; in three of these there was advanced fatty degeneration of the heart muscle (two myomata and one ovarian cyst) and, in fifteen, brown atrophy of it (five ovarian tumors, five myomata, and five pregnancies). Five deaths occurred before any operation, nine after operation, and five following labor.

This interesting question has been studied by other authors also. Fehling,[19] in a series of fourteen hysterectomies, studied all the patients from this point of view, and found in four of them manifest signs of cardiac alteration. He also observed at the same time three cases of fibroma of middle size, with symptoms of heart disease; two of these patients died afterward, one of them suddenly. In America, Dower[20] published an observation of this kind; and in England, B. Fenwick[21] presented to the Gynæcological Society of London a memoir upon the subject. In France, Sebileau[22] collected confirmatory cases. Among eighteen cases of tumor of the abdomen which he observed in reference to this point, seventeen had cardiac trouble indi-

cated by a murmur; but in the three cases of myoma which he cites there was no autopsy. We should, then, auscultate carefully every patient with a tumor of any considerable size; the dull character of the heart sounds, the dyspnœa, and the general debility may lead us to fear a fatty degeneration of the myocardium. Brown atrophy may not give any special symptoms; it is found chiefly in individuals who are much weakened by hemorrhages.

I share in the opinion of those surgeons who see in this lesion a new indication for operation and at the same time a grave addition to the prognosis.

Among the signs furnished by local examination, that which is common to all tumors, whether large or small, should be given the first place, namely, elongation of the uterine cavity. This is constant in all tumors during their evolution; that is, all giving rise to morbid phenomena. The uterus is dilated both with a small interstitial fibroma and with a small polyp, since it is hypertrophied under the influence of what Guyon has called the "fibrous pregnancy." With a large fibroma the uterus is also elongated by the eccentric development of the tumor, and the traction which it causes upon the cervix; the sound may pass as far as twenty centimetres (eight inches).

This passage of the uterine sound should always be done with the greatest care; it is generally possible to use a silver instrument which one can curve as is necessary. But for fear of meeting difficulties we may employ a urethral bougie which is moderately flexible, seizing it close to the cervix to determine how far it has penetrated. This simple instrument is preferable, I think, to Caulet's metallic hysterometer or to Terillon's hystero-curvimeter.

The uterine cavity may be effaced by a tumor which projects into it, and the sound may not pass.

The search for the tumor should be made by bimanual palpation, aided by rectal touch; and in difficult cases it may be well to administer an anæsthetic, to relax the abdominal walls. One general remark is applicable to all these examinations—they furnish very variable information, according as they are made during or after a fluxionary or hemorrhagic period. In the second case we often find a great diminution in the size of the tumor, which might cause mistakes as to the internal treatment to be followed. We must be on our guard as to the contractions which some have claimed to feel in certain of these tumors; a fibrillary movement of the abdominal walls, the gliding of a loop of the intestine, might easily give rise to this illusion.

When the tumor has effaced or passed beyond the cervix it is accessible to vaginal touch.

Diagnosis.—From a clinical point of view we may divide these fibrous bodies into three great classes, according as the tumor (1) is very small and interstitial or (2 and 3) is well characterized and pursues its evolution toward the peritoneal or the uterine cavity.[1] In the first case the chief symptoms are those of the complicating metritis, the metritic type.

In the second form, with a vaginal evolution, we must distinguish the varieties caused by *A*, submucous fibroma of the body; *B*, pediculated fibroma of the body, or polypi; *C*, fibroma of the external os, or of the sub-vaginal portion of the cervix.

In the third case, with an abdominal evolution, we must distinguish, *A*, pediculated fibroma; *B*, those developed at the fundus above the attachment of the broad ligaments; *C*, those from the body of the organ below the attachment of the broad ligaments; and, among these last, *D*, those of the sub-vaginal portion of the cervix below the peritoneum which have a pelvic development in the tissues of the lesser pelvis. The following table renders this clear:

I. Metritic type.—Small interstitial fibroma.
II. Type of vaginal evolution:
    A. Fibroma of the external os—sessile or pedicled.
    B. Submucous fibroma of the body.
    C. Fibroma of the body, pedicled or polypi.
        a. Intra-uterine.
        b. With intermittent signs.
        c. Intra-vaginal—var. enormous polypi.
III. Type of abdominal evolution—subperitoneal or interstitial:
    A. Pedicled fibroma.
    B. Sessile fibroma, not in the broad ligaments.
    C. Sessile fibroma, in the broad ligament:
        a. Abdominal.
        b. Pelvic.

I. Diagnosis of Fibroma of the Metritic Type.

Small Interstitial Fibroma.—When the tumor is not very large and has no tendency to project from the uterine wall (Fig. 127) it is at times very difficult to recognize the real source of the morbid phenomena observed, the chief of which would be: persistent hemor-

rhage coincident with enlargement of the uterine cavity, and finally the discovery of a tumor.

We must eliminate hemorrhagic metritis. Early pregnancy is accompanied by cessation of the menses, but we should remember that in exceptional cases they have persisted. Abortion with delay in the involution of the uterus caused by retention of placental fragments, is distinguished by its special course and by the study of the material furnished by the curette. Cancer of the uterus is also accompanied by hemorrhage, but with this there is fœtid leucorrhœa, and the curette will remove fragments which under the microscope determine the nature of the tumor. Inflammations of the tubes and ovaries are a frequent source of error, for there may be repeated hemorrhages, and a tumor (hydro-, hemato-, or pyo-salpinx) which appears to form part of the uterus, attached either to the sides of the organ or to the posterior surface in Douglas' pouch. We cannot always in our search determine the presence of fluctuation, and it is dangerous to examine for it with too much zeal; in the small, tense tumors it is generally absent. The very great rapidity of the formation, the patient's own story, the rational signs, careful local examination under the influence of anæsthetics, and the absence of increase in the size of the uterus are all valuable means for recognizing disease of the adnexa.

Anteflexion and retroflexion, although accompanied by bleeding, do not deceive us for very long; the nature of the tumor which we feel in the cul-de-sac on one side or the other of the vagina should be quickly recognized by the sound and bimanual palpation. The small collections of fæces which are found in the rectum and felt by vaginal touch need only be called to mind in order to dismiss them; they could deceive no one but a novice. The finger indents them and a purgative causes them to disappear.

II. Diagnosis of Fibroma with a Vaginal Evolution.

A. Of the External Os.—The existence of a tumor hanging from the lip of the cervix is here the capital symptom. Ordinarily it is not ulcerated, but is smooth and elastic. Passing the index along it to the base, we feel the os in front or behind, according to the lip from which it hangs; the other lip is usually thinned and partially effaced. This circumstance has caused the error of supposing the uterus everted or that the tumor came from the interior of the organ.

Attentive examination of both lips by touch, of the cavity by the sound, and of the position of the organ by bimanual palpation will furnish the needed corrections. A fibroma of the external os may itself be pedicled, and the fact should not be forgotten. Finally, when they grow at the level of the vaginal insertion they may split the recto-vaginal septum and then simulate a tumor of that situation [23] or they may develop toward the uterine cavity.[24]

B. Submucous Fibroma.—The hemorrhages and the increase in the size of the uterine cavity are here especially marked, and the presence of the tumor is readily ascertained. For this purpose, touch should be practised during the bleeding, since at that time the uterus is softened and the os patulous. If necessary, we may increase the cervical dilatation by the means already described, and confirm the diagnosis by intra-uterine touch. On the level face of the uterus there is then to be felt a tumor which projects into the cavity and reduces it to a mere linear cleft, laterally distorted. The surface of the tumor is covered by hypertrophied mucous membrane, which is smooth and downy. There is no pedicle, but a large base of attachment, which excludes the idea of a polyp.

Externally the uterus has a globular form which would resemble that of the first months of pregnancy, were not hemorrhages exceptional at that time.

When the surface of the tumor has become gangrenous, the possibility of a mistaken diagnosis is much increased; the sanious discharge, the irregular and putrid surface, and the patient's cachexia make us think of malignant tumor, or of cancer of the body of the uterus.

C. Pedicled or Polypoid Fibroma of the Body.—We can divide the evolution of a polyp into three stages, and each one of these corresponds to a variety of fibroma. In the first, the pedicled fibroma is still far from the uterine cavity, which is often very much dilated; that is, it is intra-uterine. In the second period there is a tendency to pass beyond the cervix, after dilating it, which is far more marked at the moment of the monthly discharge and disappears betweenwhile; this is the variety with intermittent symptoms. Finally, in the third period of their evolution, these polypi protrude completely from the uterus, have become intra-vaginal, and may take on an enormous size,[25] thus forming a new variety from the point of view of the symptoms and possible operation.

These intra-uterine polypi may be distinguished from sessile sub-

mucous tumors by direct examination after dilatation of the cervix, the presence of the pedicle being characteristic.

A polyp with intermittent symptoms, occurring at the menstrual periods, may pass unrecognized unless we see the patient at the favorable time and here again the cervix will require to be dilated, both for diagnosis and to permit removal.

An intra-vaginal polyp of the vagina, coming from the body of the organ, would seldom be confounded with a sessile or pedicled fibroma of the cervix; touch alone should reveal its relations. We might think of an inverted uterus, especially if the organ itself contained a fibroma; and this error is very easy to make, as is shown by the fact that more than one distinguished surgeon has committed it. This inversion may be unrecognized in two conditions—if there is a complicating polyp or submucous tumor which alone attracts attention;[26] and when it is the only alteration, and the constriction at the level of the internal os makes the upper part of the everted organ seem like a pedicle.[27] The operator may especially note, as an aid in guarding against mistake, the extreme sensitiveness of a tumor formed by the uterus, though this symptom is very inconstant. But the sound and rectal touch, combined with vesical catheterism and bimanual palpation under anæsthesia, will make it evident that the uterus is not in its usual place—that we have to do with a case of uterine prolapse.

This examination is at all times difficult with polypi which are of great size, for they fill the vagina and even project from the vulva, causing a displacement of the uterus. They may also form adhesions with the vaginal walls, provoke ulcerations, or themselves slough in places; and, more than that, by retention of decomposing fluids above them in the occluded vagina, they may cause the absorption of these putrid products, and thus seriously disturb the general condition. Though the statements of the patient and the local signs might lead us to suspect cancer, a careful examination will quickly correct the error.

III. Fibroma with an Abdominal Evolution.

A. Subperitoneal: Pedicled.—The uterus is here entirely distinct from the tumor, whose movements cannot be transmitted to the finger placed in the vagina (Fig. 133). The cervix is generally raised; there is usually no metrorrhagia; and the cavity of the uterus is not enlarged. Ovarian cysts are the most difficult things from which to

differentiate these fibromata. The fluctuation in the cyst would be pathognomic, but it might be confounded with the softness of an œdematous fibroma; and if the cyst were small and tense or multilocular, with small areolar cavities, it would be very hard to appreciate. Examination under anæsthesia would then be necessary to remove all doubt. In the case of fibro-cystic tumor the fluctuant parts alternate with harder portions.

Another point for consideration is that the fibroma develops very slowly and the ovarian cyst rapidly. As Thornton has remarked, "there are certain pedicled fibromata which run so rapid a course that confusion is easy, as they also react but little upon the uterus; and thus in every ovariotomy we should be prepared to do a hysterectomy." [28]

Exploratory puncture, which has been abused in former years, should be completely given up; it may cause serious accidents, as discharge of the cyst within the abdomen, internal hemorrhage, thrombosis or embolism in case of a fibroma, or even more or less extended peritonitis. Harsha [29] observed, in the case of a fibro-cystic tumor, that he could clearly perceive contractions in the muscular wall, and proposed to anæsthetize the patient at the menstrual period—a time most propitious for the examination—and verify the existence of contractions in the tumor by percussion.

H. Jones [30] has described an exceptional condition of the gravid uterus which simulates pedicled fibroma. In four observations which form the basis of his paper, the uterus formed a hard, round tumor, movable, and of the size of the fist, between the symphysis and the umbilicus, and appeared to be a mass connected by a long pedicle to some pelvic organ. Pressure upon the tumor moved the cervix but little, there was no fluctuation, and the sound (before the pregnancy was recognized) gave a depth of the uterine cavity of 12 cm. The author attributed this peculiar state of the organ to the absence of liquor amnii; the fundus, the point where the ovum is commonly attached, would then become globular, while the lower segment would remain lax; hence there would be a false sensation of a pedicle. It is very probable that the case occurred in a woman with hypertrophy of the supra-vaginal portion of the cervix. A short delay is all that is needed to make the matter clear.

Floating kidneys may be recognized by their contour and the entire absence of any connection with the uterus.

The large cancerous cakes formed in peritoneal carcinoma by the

degeneration of the omentum may be mistaken for fibroma if there are adhesions to the uterus; but the sanguinolent ascites, the shape and situation of the tumors, the cachexia, and other symptoms, with the freedom of the uterus as disclosed by the sound and bimanual palpation, are sufficient to distinguish the two diseases.

B. Subperitoneal Fibroma, Sessile and Free: Not in the Broad Ligament.—The differential diagnosis is here the same as in the preceding cases. Occasionally it is very difficult to diagnose pregnancy complicated by such a tumor, for even exact analysis of the symptoms, with careful attention to those characteristic of the fœtus, may be without result during the first months.

Fibroma of this variety may be discovered by its solid union with the uterus, for the two constitute but a single mass on bimanual palpation. At the same time the examination reveals how much the lower portion of the organ is involved; for if the tumor has developed above the insertion of the adnexa this part will be intact, but in the contrary condition it will become a part of the tumor's circumference. The mass is then immobilized by the walls of the lower pelvis, and permits no lateral movements; but on bimanual palpation we feel that the iliac fossæ are free, which distinguishes it from the next form.

C. a. Intra-Ligamentous Fibroma—Abdominal Variety.—Here the development of the tumor is altogether lateral, splitting up the layers of the broad ligaments, and ordinarily the tumor lies in one of the iliac fossæ, and fills it up. By touch and palpation we can determine its connections with the uterus, and we find usually that but one of the lobes of the tumor is actually in the ligament, the other being above it; but that which gives the tumor its name and importance is its very grave nature and the special therapeutic measures required. It is only exceptional that there is any doubt as to the existence of a fibroma, though before complete examination we might suppose that there was present a tumor of the iliac bone.

Parovarian cysts within the broad ligament may be recognized by their fluctuation.

Encysted tumors of the tubes, especially hydro- and hæmatosalpinx, may be difficult of diagnosis from their adhesion to the posterior surface of the uterus and the difficulty of appreciating any fluctuation; but here the patient's history, the use of the sound, and the determination of the *grossesse fibreuse* are valuable diagnostic measures.

C. b. Intra-Ligamentous Fibroma—Pelvic Variety.—The chief

characteristic of this variety is found in the development of the neoplasm within the pelvic floor between the organs attached there, and its tendency to fill up all spaces between them and raise the body of the uterus into the abdomen (Fig. 136, *B*). Clinically we have, as the result of this, the most serious compression symptoms, and for the operator there are extreme difficulties.

The starting-point of these tumors is always in the subserous portion of the uterus; that is, the supra-vaginal part of the cervix ; if their attachment is anterior, while their volume is still very small, they may cause grave disturbance of the bladder, dysuria, and retention of the urine; and it is in this variety also that we observe especially the intense pain caused by pressure on the nerves, as well as the accidents of intestinal compression.

Vaginal and rectal touch, combined with palpation, determine the close connection of these tumors with the organs of the pelvis; the culs-de-sac are found to be depressed or obliterated, and the cervix may have wholly retracted to form part of the tumor. About its orifice, of which only the external os may remain, there are felt hard nodular masses which are connected with the uterus and which pressure does not displace; it is in the latter respect especially that these tumors differ from those of the body of the uterus, which invade the pelvis only as there is a retroflexion developed. These latter, which become pelvic by immigration, may produce the same symptoms from compression and give the same sensations to the examining finger, but they are not tightly bound down unless there are adhesions of inflammatory origin; and pressure made through rectum and vagina upon the morbid mass, with the woman in the genu-pectoral position, will change the tumor's place if it does not return it above the superior strait.

Hæmatocele, inflammatory foci about the uterus, and encysted collections in the tubes are at times difficult of diagnosis, and have been the cause of numberless errors; no doubt the so-called medical treatment of fibrous tumors owes much of its success to this fact. Before finishing the clinical description, I may mention certain symptoms which are occasionally observed.

It is common to all tumors which compress the great vessels to present an intermittent murmur, called the uterine souffle in pregnancy. It has little diagnostic worth. If it is absent in a case of ovarian tumor, we may then be sure of finding fluctuation; with solid tumors, on the contrary, it is present.

With telangiectatic fibroma there is often a distinct area over one of the broad ligaments where we find a continuous murmur which resembles that of an arterio-venous aneurism, and, like it, is accompanied by a thrill; I have observed one such case.

Ascites is uncommon with fibroma, but it may develop when the tumor is very movable or when it has undergone a degeneration from torsion of its pedicle; in cachectic subjects, also, it will at times appear with tumors which in another patient would certainly not have caused it. I have observed it in these conditions in a patient who suffered from mental disease, where hysterectomy was successfully performed and ameliorated the mental condition. Hemorrhagic ascites is an almost constant symptom with malignant tumor, and its presence warrants a very guarded diagnosis. I have already spoken of chylous ascites as a great rarity.

Serous cysts of the broad ligament coexist quite frequently with fibroma of abdominal development, and are more than merely fortuitous, since the exaggerated nutrition caused by the tumor favors their development in the vestiges of the Wolffian body which constitute the parametrium. Some large tumors of the uterus drag the organ downward and cause a genital prolapse, as do also some of the ovarian tumors. Inversion of the uterus may be found with polypi, and, exceptionally, with subserous fibroma.

A rare accident, of which I have seen one case and which has been made the subject of a thesis by Düll, of which Schröder[31] has given an analysis, is the separation of the linea alba and consequent eventration with the formation of a hernial sac, in which the large fibroma, usually pedicled, is found lodged. In my case the patient was an old woman who had carried this singular hernia many years. Its size was larger than her head, there was so small a ring that reduction was impossible, and the sac was thinned and rested upon her knees. In a case mentioned by Düll death followed mortification of the sac.

Course and Prognosis.—The great majority of these cases present nothing during life beyond a few vague symptoms which are often unrecognized. But there are others which cause serious disturbance throughout the entire period of sexual activity until the menopause, when most of these tumors atrophy and diminish in volume by induration and involution. This effect is at times hastened by a pregnancy, but the rule is not absolute. A certain number of these tumors have a veritable "galloping" course, as I have termed it,[32] causing death, not so much by the hemorrhage, as by the exaggerated

development of the morbid mass and the phenomena of compression and denutrition which result from it; of this number are fibro-cysts in general and some simple fibro-myomas. On the other hand, there are certain tumors of a less rapid course which continue to grow indefinitely after the critical age;[33] but most frequently there is a distinct retardation at that epoch.[34]

The natural evolution of a fibroma tends toward its expulsion from the uterine walls, either externally or into the peritoneal cavity, and this effort is shown by the pedicles which are produced in these two directions. Although such cases are rare, still at times we observe the accouchement of a polyp under the influence of strong uterine contractions with rupture of the pedicle; or the same thing may occur from the weight of the tumor alone and the thinning of the pedicle.[35] In these conditions an effort of defecation or of vomiting suffices to expel the polyp.[36] The rupture of the capsule of a submucous fibroma may produce its spontaneous enucleation, preceded by a period of pains and hemorrhage,[37] or suddenly after some effort[38] (see Plate V.), or while under examination; it has sometimes followed labor and the consecutive contraction of the uterus.[39]

An analogous process to that which causes the rupture of the pedicle of a submucous polyp may also liberate a fibroma which is subserous and pedicled.[40] The tumor then remains grafted to some point where it has formed adhesions, or lies free in the peritoneum and undergoes a kind of mummification.

Another and more serious mode of spontaneous extrusion is produced by the mortification of the tumor, the sphacelated portions tending to escape outwardly; at times this takes place toward the uterine cavity and all may go well, despite the danger of infection. Or there may be perforation of some neighboring organ, as the bladder,[41] the recto-vaginal pouch,[42] or the abdominal wall; the two former almost always causing death, the latter sometimes ending in recovery.[43] Finally, the tumor may undergo absorption, as I have said above, after pregnancy,[44] or at the menopause;[45] but in the latter case there is more truly an induration and diminution than complete disappearance. Although fibromata are an undoubted cause of sterility, fecundation may take place and pursue its normal course.

The cause of death may be the gradual exhaustion produced by the profound anæmia which follows repeated hemorrhages, or it may occur from successive attacks of chronic peritonitis, from disease of the kidneys and uræmia, or from cardiac complication and heart-

MUNDÉ'S CASE OF SPONTANEOUS EXPULSION OF A SUBMUCOUS FIBROMA FROM THE UTERUS AND VAGINA

LINDNER, EDDY & CLAUSS, LITH. N. Y.

failure. Rupture of a cyst, or inflammation and gangrene of the tumor, propagated with or without perforation to the neighboring serous membrane, may set up an acute peritonitis, with a rapidly fatal termination. Or gangrene of a submucous tumor may be the origin of a fatal septicæmia. Ghastly, sudden death has been observed after embolism,[46] especially in the case of fibro-cysts of telangiectatic nature; exploratory puncture seems to favor the production of thrombi in the large venous sinuses. Almost immediate death by shock has been observed after intra-abdominal rupture of a fibro-cystic tumor.[47]

Etiology.—In spite of the patient researches which have been made upon this subject, we still know nothing positive about the exciting causes of uterine fibroma;[48] we can only give certain predisposing conditions, among which are race (the negro being more subject to such tumors than the white) and advanced age; in the white races the most susceptible age is from thirty to forty years. Sterility is not so much a cause as a consequence. All the local exciting causes which have been advanced are without proof. On the other hand, it has been supposed that a celibate life disposed to their formation; but Gusserow's statistics disprove the idea. Fehling[49] has attributed great importance to incomplete involution after labor and abortion where a sufficient period of repose was not enjoyed.

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CHAPTER X.

MEDICAL TREATMENT OF FIBROMA—SURGICAL TREATMENT OF FIBROMA WITH A VAGINAL EVOLUTION.

The treatment of fibroma may be divided into medical and surgical.

Medical treatment of these cases is often only the treatment of the symptoms. The various substances which have been advocated for the purpose of acting directly upon the tumor itself, either to cause contraction of the nutritive vessels (as ergot) or to set up a fatty degeneration (as arsenic and phosphorus), appear to produce a good effect by far other means; the first contracting the uterine vessels and thus decreasing the hemorrhage, the second relieving the general malnutrition. As specific agents, electricity, to which certain authors attribute considerable importance in the absorption of fibrous tumors, and mineral waters charged with sodium chloride, of which the action is incontestable, may be mentioned.

Ergot injections have been practised since the writings of Hildebrandt,[1] who gave his name to the method. The treatment must be used persistently for months; for which purpose the following formula may be employed,

		Gm.	
℞	Ergotini, ...	5.	. . gr. lxxv.
	Chloral hydrat., . . .	1.	. . gr. xv.
	Aquæ destill., . . .	100.	. . ad ℥ iij.

M.

and twelve minims injected daily. If it is desired to preserve the solution for a long time, it is well to add, besides the chloral, which is intended to accomplish the same object, a few drops of Van Swieten's fluid. A wire must be kept in the needle to insure its being permeable, and it must be passed through the flame of an alcohol-lamp after each injection to dry it, and beforehand to sterilize it, so that abscess may be avoided. The injection is best made in a fleshy part, like the deltoid or the buttock, the needle being inserted perpendicularly from a half to three-fourths of an inch. To prevent pain, Bumm advises

that the solution be neutralized with soda and filtered.[2] The patient may be taught to give herself these injections; Winckel speaks of a woman who had thus done it fifteen hundred times.

In spite of the so-called demonstrative cases which have been published, the effect of this method upon the development of fibrous tumors is still contested. Schröder asserts that he has seen no diminution in the size of the tumor after four hundred injections, although the dose employed was stronger than the one I have indicated;[3] but he has noticed that the tumor remained stationary, though it had been increasing up to that time. Leopold recommends the method, and Byford,[4] in America, is its warm partisan. On the other hand, many others declare that they have never obtained any good effect from it.[5]

In the use of this treatment, if the prescribed dose is much exceeded it may produce cramps of the extremities, vomiting and fever, or even suppuration of the tumor.[6]

One of the good effects attributed to the ergot treatment is that it favors the spontaneous expulsion of the fibroma; but it is doubtful if it will cause the formation of a pedicle in a tumor which is submucous, and those which are already polypoid require more than medical treatment.

Churchill and MacClintock strongly advise the administration of tincture of cannabis indica in six-drop doses, given three times a day, to arrest the hemorrhage. Antipyrine has been tried with the same object.[7]

A new drug, which I have used with good results, lately introduced into European practice from America by Freund, is the fluid extract of hydrastis canadensis. This acts as a hæmostatic by contracting the vessels, while its bitter taste makes it a good stomachic; the dose is twenty-five drops three or four times a day. Schatz praises the drug highly,[8] claiming to have seen a fibroma, which had reached the umbilicus, return to the pelvic cavity after two years' use of hydrastis. Lack of success, according to him, may be due to the difficulty of procuring a pure form of the medicine.

Bromide of potash, given in small doses for a long time, has been advocated by Simpson; but it seems to act only as a sedative against the pain, and its prolonged use may impair the digestive function, which it is so important to preserve.

Arsenic, advised by Guéniot, does not display the selective action which had been hoped from it, but, as a tonic, may be of benefit.

Baths of mineral waters containing sodium chloride have an undoubted beneficial action on fibrous tumors, doing more than simply improving the general condition, and the cases where I have obtained good results from them are very numerous. Many of these bitter waters contain alkaline bromides and iodides which impart to them a peculiar sedative action, those of Salies-de-Bearn, for instance, containing ten grammes of bromide of sodium to the quart. As the result of Apostoli's work, who has followed with rare patience the way opened by his master Tripier,[9] electricity has recently been much employed, especially in America and England.

The application of electrolysis to fibromata was made in 1871 by Cutter,[10] in Ameria, and in 1876 by Ciniselli and his pupil Omboni in Italy.

As is well known, the effect of a strong current of electricity is to produce chemical decomposition of the tissues, the positive electrode attracting the acid elements and the negative the basic: if then we put the positive (acid) pole in contact with the tissues, either on the surface of the mucous membrane or in the depth of the tumor, we produce an eschar similar to that which follows the application of acids, ending in a cicatrix which is fibrous and retractile. If the contact has been made with the negative pole, the result is a soft non-retractile eschar, like that caused by potassium hydrate. This excessive chemical action can be prevented at one or the other pole by largely increasing its area and covering it with some good conducting substance (clay, gelosin, gelatin, wet cotton or chamois leather, etc.), which spreads it over so large a surface that its action is not felt.

The first who employed electricity used feeble currents which had a catalytic effect without actual destruction of the tissues, and many authors still hold to this method as least dangerous.[11] But the great majority follow the example of Apostoli [12] and Engelmann [13] (of St. Louis), employing currents of high intensity from a battery of Leclanché cells. Apostoli, in 1884, did not use more than 100 milliampères; he now reaches 250 at times. The strength of the current is measured by a galvanometer. (The "ampère" is the current developed by an electromotive force of one "volt" in a circuit where the total resistance is one "ohm." The "volt" is an electromotive force which differs but little from that of one "Daniell" cell; the "ohm" is the resistance of a column of mercury 1 mm. square, 5 cm. long.) His technique is as follows:

One of the poles is applied to the abdomen by means of a large

moist clay electrode or other appropriate medium, and the other pole is introduced into the uterine cavity in the form of a platinum or carbon sound, which is insulated with celluloid or rubber over the part which does not enter the uterine cavity. The electrode is pushed into the substance of the organ "after preliminary puncture where we desire to hasten the denutrition of the neoplasm, or where the cervix is impermeable or inaccessible." Thus an intra-uterine eschar is produced, the positive pole being used when the tumor is hemorrhagic, the negative in the opposite case.

Apostoli asserts that "if well applied and continued long enough (from three to nine months), this method is very successful, leading in 95% of the cases to the reduction of the tumor from one-fifth to one-third of its former size, and sometimes to one-half and producing rapid and lasting control of the hemorrhage, and disappearance of compression symptoms."

Engelmann describes a similar technique, with the employment of 50 to 250 milliampères during three to six minutes; exceptionally with double puncture of the tumor through the vagina.

The mode of action seems to be a double one. In the first place the mucous membrane is cauterized, producing, as Apostoli expresses it, an actual electric curettage; and, as well known, the curette will often control hemorrhage by destroying the diseased mucosa: both curette and electricity may thus cause a superficial mortification of a submucous fibroma. Bröse[14] especially insists upon this mode of action for electricity, and Nicaise[15] agrees with him in considering the destruction of the mucous membrane as the chief benefit derived from it; this destruction is never more than an incomplete one, in a straight line corresponding to the sound in the uterus. It should not be compared with that obtained by the curette, which works effectively in all directions, penetrating all the corners. Danion,[16] in his experiments with animals, demonstrated that, with a sound introduced into the uterine cornu of a rabbit, the current used by Apostoli caused but very slight cauterization.

Still another mode of action is claimed by all partisans of the method, whether they use feeble or strong currents, namely, the so-called "interpolar" action. Unfortunately this is pure theory; is it a chemical change in the living elements of the tumor, or a vaso-motor effect with electro-tonic action on the muscular fibres? Danion has even spoken of galvanic massage, insisting that the current be reversed for the purpose. All these ideas are hypothetical and rest upon im-

agination only.[17] The method is not altogether safe, for several fatal cases have been already recorded.[18]

Far more dangerous yet is the method of Cutter, who employs a battery of great strength and pierces the tumor in two places, either through vagina, rectum, or abdominal wall: he has had four deaths in

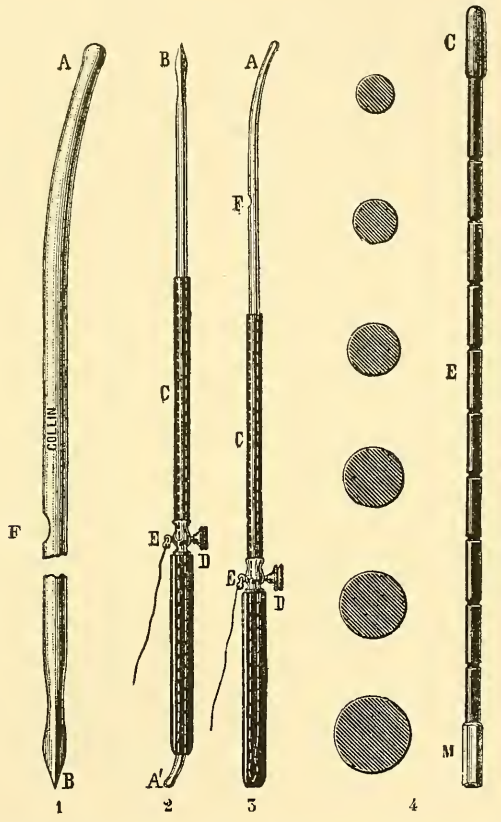

FIG. 140.—APOSTOLI'S UTERINE ELECTRODE. 1, Natural size of the instrument; *A*, ordinary hysterometer; *B*, trocar for puncture; *F*, notch marking average depth of uterus. 2 and 3, Entire instrument, reduced to ⅓ size, in *C*, celluloid handle, to protect the vagina; *E*, electrode; *D*, thumb screw, to regulate length of exposed sound. 4, Carbon electrode for galvano-chemical cautery; ⅓ size. Apostoli now replaces the platinum trocar by one of gold or steel, which have the advantage of being more readily sharpened.

his first 50 cases. His results are as follows: arrest of the tumor, 25 cases; tumor not arrested, 7 cases; improvement, 3 cases; cure, 11 cases. Cutter, in seeking the electrolytic destruction of the tumor, follows other theoretical views than those of Apostoli, though the latter seems to have made certain attempts in the same direction, when in exceptional cases he buried the electrode deeply in the centre of the tumor.

One of the inconveniences of this method is that it gives rise to protracted suppuration.[19]

Reacting against these violent measures, Danion and Championnière[20] advise the employment of feeble currents of from 45 to 65 milliampères, or very rarely up to 90, claiming that these weaker currents are quite as satisfactory as the stronger. Danion attaches much importance to frequent reversal of the current. He introduces

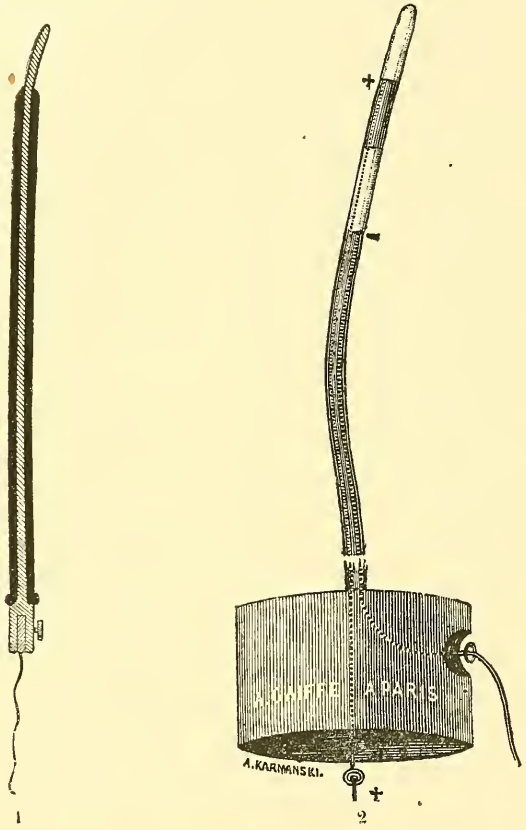

Fig. 141.—1, Tripier's Unipolar Uterine Electrode; 2, Apostoli's Bipolar Uterine Electrode.

the electrode into the cervix, but claims that he can obtain the same effects by placing it in the vagina if he takes the necessary precautions.[21]

It is very difficult, even now, to pass judgment upon the value of electrolysis as applied to uterine fibromata. Diverse opinions are held in New York,[22] in London,[23] in Berlin,[24] and in France. Doléris,[25] who has employed the method in a series of twenty cases, thinks that he is often the victim of an illusion, mistaking for a diminution

in the size of the tumor what is really only its subsiding into the lesser pelvic cavity. One must further be on his guard not to mistake for the tumor the perimetritic exudations which often become absorbed as the result of the rest and good care. The value of this treatment has been overestimated as regards the diminution in the size of the tumor, for when this effect is produced it is only temporary and ceases when the electricity is discontinued,[26] but the majority recognize that it does lessen the hemorrhages and the pain and improve the general condition.

Without accepting the exaggerations of Keith, who has declared it criminal to practise hysterectomy unless electricity had been first employed, we should remember that in it we have a therapeutic resource which should not be neglected in those cases where operation cannot promise a radical cure.

I will only mention the use of the interrupted constant current, of which Aimé Martin and Chéron have spoken warmly; its employment is no more useful or general than is the use of faradization.

[While ultra-enthusiasm and too great expectations have undoubtedly led to failure or disappointment in the use of electricity, as I have stated in Sajou's "Annual" for 1890, from which the following is taken, there can be no question of its importance as a palliative therapeutic agent. When carefully employed, the treatment is generally considered to be free from any danger to life, unless electropuncture be the method. Most of the unsatisfactory results have been in the case of tumors which have proved cystic—a condition which absolutely contra-indicates the use of electricity—or in cases where the proper precautions in regard to cleanliness or asepsis were not employed.

The consensus of opinion is practically that expressed by Delétang, who states that the immediate effects of electrolysis consist in (1) contraction of the uterus and its tumors; (2) a congestion of the adjacent tissues, which continues for several hours and is attended with colic; (3) a subsidence of pre-existing hemorrhages. The consecutive effects are: 1. Slight hemorrhage. 2. Pain, with functional disturbance. These phenomena have no relation to the tumor, belonging rather to the inflammatory zone surrounding it, and quickly pass away. 3. The tumor diminishes, the morbid symptoms disappear, and the general nutrition improves. There is sometimes a temporary aggravation of the symptoms at the commencement of the treatment, depending on the congestion mentioned above.

Some knowledge of electro-physics, carefulness in manipulation, and exactness in dose are necessary to the effective employment of galvanism, together with a proper selection of the cases and accurate knowledge of the tumors to be treated. Ordinarily no fibroid should be attacked by galvano-puncture when it is possible to reach it through the uterine canal. When the tumor can only be reached by puncture, this should be either through the cervix or the vaginal wall, using particular care to determine beforehand the position of the bladder, so that it may be avoided. No tumor in which there is a suspicion of cystic regeneration should be treated by electrolysis. The current must be localized and its effects confined as closely as possible to the neoplasm. One pole must serve as the active agent for the application of the electricity, and upon this its entire effect is concentrated. This is termed the active pole. The current at the opposite pole is to be dispersed over as large a surface as possible, so that its effects will be least perceptible. The poles should be placed on opposite sides of the diseased part, and as near to it as possible, the indifferent pole being placed on the largest and least sensitive surface. The current should be of sufficient strength to accomplish the object desired in the shortest possible time without detriment to the patient. This strength will usually be from 80 to 250 milliampères. The first instrument required is a battery of sufficient constancy and strength. One which has been found most serviceable is composed of fifty or sixty improved Law or Leclanché cells. These can be stored in any closet, or even in the cellar, connected in series with wires leading to any convenient spot in the office. Here we need a rheostat for the purpose of controlling the current strength, and an ampèremeter for measuring the amount used. In addition to these, there are the connecting cords, the abdominal and the internal electrodes. The abdominal electrode may be the original one of clay, originally devised by Apostoli, or a thin plate of lead or tin (Engelmann), as large as can be used upon the abdomen, covered with a thin layer of soft clay, held in place by gauze; or it may be made of gauze covered with wet canton flannel, or thin, soft buckskin, held in place on the abdomen by a quilted sand-bag. The internal electrode is either a gold or platinum-plated sound, or a curved rod of carbon, or, for electro-puncture, a strong steel needle, insulated to within one-half inch (12.5 millimetres) of the point.

If electro-puncture is to be employed, or the patient is hyperæsthetic or nervous, anæsthesia will be necessary; but, ordinarily, if

skilfully and carefully used, the current may be passed without an anæsthetic. The patient is to be put upon the operating-table or chair in the dorsal decubitus, the clothing loosened about the waist, the corset removed; the abdominal electrode, previously soaked in warm water, is then snugly adapted to the abdomen, so that the epidermal layers of the skin may have a chance to become thoroughly moistened, the current then passing with much less resistance and consequently less pain. Before placing this electrode, any scratches, pimples, or excrescences should be covered with bits of plaster or oiled silk, as otherwise the passage of the current will cause much pain at these points. Warm, dry towels should be placed over and above the electrode to protect other portions of the patient's body, as well as her garments, from any excess of moisture. The vagina should now be cleansed by an antiseptic douche and the uterine electrode carefully introduced; or, if galvano-puncture is to be employed, the needle is introduced to the depth of from 1 inch to 1½ inches (25 to 37 millimetres) at a point previously determined. Being certain that the rheostat is at its greatest point of resistance, the connecting cords are now attached to the electrodes and the current turned on very slowly and evenly, so that in the course of a minute we have increased it from nothing up to 50 or 100 milliampères or more. The first sitting should not be for a longer time than six minutes, the current remaining at its strongest for half of this time, and then being slowly reduced. During the passage of the current the operator must constantly observe both his galvanometer and the patient. The needle should remain perfectly steady, with no oscillations which would indicate jar or shock. The operator must be particularly careful to avoid any accident which might produce a sudden change in the intensity of the current, as the shocks thus produced are exceedingly trying. At the end of the sitting the vagina should be again douched and the patient kept in bed for the rest of the day. If there are evidences of pain or reaction, and in susceptible individuals, it is well to insist on rest in bed for several days, together with the use of the ice-bag over the region of the tumor. Should there be any bleeding, it may be necessary to tampon the vagina with styptic cotton. The necessity for this, however, is rare. We must always warn the patient of what is coming; we must first apply the moistened, warm, dispersing electrode to the abdomen; we must have the intra-pelvic electrode aseptic, and introduce it with the greatest possible gentleness; we must thoroughly insulate all but the active portions of the instru-

ment, avoiding metallic contact with vagina, vulva, or speculum, and never establish the current until intra-pelvic disturbance has ceased; always increase the current very gradually, bearing in mind that the intra-uterine or intra-pelvic pole must never cause pain. All shock must be avoided, the connections made before the current is established, and not broken until it is entirely turned off.]

Treatment of Tumors Incarcerated in the Pelvis.—Certain fibrous tumors, either developing in the lesser pelvis or retroflexed into it, may cause serious compression of the rectum, bladder, or nerves, even producing ileus, uræmia, or paraplegia. At times all these symptoms may be relieved by replacing the tumor above the promontory. The patient is put in Sims' position, or, better, in the genu-pectoral, and the tumor is elevated by pressure from the vagina or the rectum; if there is much muscular contraction, chloroform should be used. This procedure may be adopted also in cases of pregnancy complicated with fibroma at the time of parturition.

Minor Hæmostatic Operations.—Before the description of the major operations for the relief of fibroma, a few words may be said about the more simple surgical measures which are employed against the often very serious hemorrhage.

Curettage and Intra-uterine Injection.—This measure has frequently been adopted, often, without doubt, from an erroneous diagnosis of hemorrhagic endometritis. Recent researches demonstrate that it is nevertheless the correct thing to do. It may be successful when the uterine cavity is not much deformed and the curette can be employed efficaciously.[27] The injection of perchloride of iron with Braun's syringe, and copious washing afterward with the double-current catheter, as described under the head of metritis, may then follow. Such injections must always be made with the greatest care, remembering that the tubes may be markedly dilated and permeable.

Dilatation of the Cervix.—This operation, advised by Baker Brown, MacClintock, and Nélaton, has been recently advocated by Kaltenbach,[28] who uses Hegar's bougies, from 16 to 18 mm., and in certain cases has obtained remarkable success. He attributes great importance to the narrowness of the cervical canal in the causation of both pain and bleeding with myomata, and especially recommends this palliative measure in women with a small tumor who are near the menopause or when it is desirable to gain time. I have seen good results from it.

Bilateral Section of the Cervix.—This operation was done first by

Nélaton, then by Baker Brown, and recently [29] has been recommended anew; but as the incision must be carried down to the chief branches of the uterine artery, it amounts to nothing more than ligation of these vessels. It is of benefit only when the neoplasm occupies the lower segment of the uterus, and is thus of restricted application.

Intra-uterine Scarification.—In cases of obstinate bleeding depending upon an intra-uterine fibroma, Martin [20] claims to have had good results from a measure formerly employed by Simpson, namely, the division of the capsule by scarification upon the projecting part of the submucous tumor, the severed vessels undergoing retraction.

Surgical Treatment of Fibrous Tumors.

The operations applicable to fibromata differ according as the tumors are accessible by the natural passages or only by laparatomy. The progress of operative gynæcology permits us to-day to avoid in most cases the division of the abdominal walls.

I shall treat in this chapter only of those tumors which by their evolution toward the vagina may be reached by that passage.

A. Fibroma of the Vaginal Portion of the Cervix.—In the cervix, owing to the small size of the part, we do not distinguish between submucous and interstitial tumors. They are ordinarily not difficult to detach from the surrounding tissues, and we may then, as Lisfranc [31] and all other surgeons have done, attempt to enucleate them by the aid of finger and spatula after removal of their lower portion and a section of the tissue, or making a conical excision, in order to facilitate the manœuvre.

It is always useless to complicate the operation by the employment of the écraseur or the galvano-caustic loop; the latter is dangerous to the surrounding parts and of too delicate an action, and should be used only in exceptional cases. The écraseur, which many surgeons still advise for the ablation of tumors by the vagina, has several defects—it may break on tissues of great resistance, it cuts very slowly and causes a loss of time during which the uterus may be bleeding above the tumor, and it has a tendency to rise upward by a climbing motion on very hard tissues, which has caused the peritoneum to be opened.[32] To avoid loss of blood, the best way is to proceed as quickly as may be with the bistoury; fibrous tumors are not very vascular, and, if certain vessels bleed, it is easy to arrest the hemorrhage by means of forceps or the thermo-cautery. If the

cervical tumor, as in one of Schauta's cases, is prolonged above into the uterus, we should not follow it too far, but limit the operation to the removal of the accessible part, leaving the base in position, which without doubt will be pushed downward by the uterine contractions, and may then be extirpated. If the tumor has no capsule, we may amputate it as high as possible, saving two lips, which should then be reunited. When there is a clean wound after enucleation, we may equalize its edges and suture them; but if primary union seems improbable, it is better to remove the débris of the capsule and pack the cavity with iodoform gauze.

B. Pedicled Fibroma of the Body or Polyp.—When the tumor is intra-uterine, it is necessary to do a preliminary operation to render it accessible; this is best accomplished by the bilateral division of the cervix with strong scissors up to the vaginal insertion. The upper

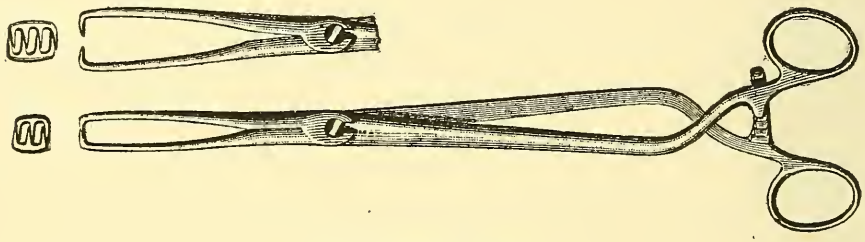

Fig. 142.—Museux Forceps.

portion of the canal is usually dilated by the tumor itself; if otherwise, the part is softened by laminaria tents, and then dilated by Hegar's bougies; or we may make a bilateral incision (pp. 112 to 118). The ablation of the polyp is ordinarily very simple. The patient is placed in the dorso-sacral position; the vagina is dilated with a speculum or retractors; and the polyp, being seized with toothed forceps (Figs. 142 and 143), is drawn downward as much as possible while the hand above the pubes examines that the uterus is not inverted. Then the pedicle is twisted by imparting to the polyp a movement of rotation on its axis, and after two or three turns a pair of strong scissors, curved on the flat, is slid up to the attachment of the pedicle, which is then divided by small cuts while the torsion continues; this has the double effect of aiding the extraction of the tumor and lessening the hemorrhage.

The usual advice is to cut the pedicle as high as possible; but by a lower section I think that there is less risk of secondary hemor-

rhage, and the stump retracts within the cavity of the uterus and is rapidly obliterated.

All the measures devised with a view to prevent bleeding should be resolutely abandoned; they have resulted in more victims than cures. Galvano-cautery, ligature, and écraseur all prolong and complicate an operation which, to be safe, should be rapid. Even Dupuytren contended against the chimerical fear of hemorrhage, and advised the cutting instrument; it is time to return to his practice. In the very rare cases, of which Trélat has cited an example,[33] where the pedicle contains large vessels, the condition may be recognized by palpation, and before operating a pressure forceps should be placed on the part and allowed to remain for several hours. If there is much loss of blood, hot injections, ergot, and tamponade with iodoform gauze will easily check the hemorrhage.

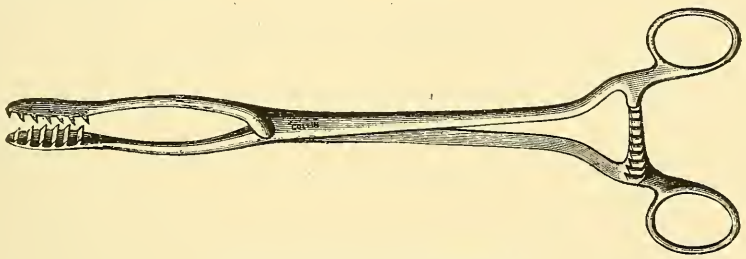

Fig. 143.—Collin's Tumor Forceps.

I have proposed [34] the name "enormous polyps" for those which fill the vagina, do not permit the finger to reach the pedicle and cannot be easily removed through the vulva; these peculiar polyps offer special operative indications. The pedicle should not be treated until the volume of the tumor has been diminished—a result easily obtained by combining certain measures which have been advised at different times. Simon's [35] method consists in making a series of transverse deep incisions one above another, until the pedicle is reached; Hegar [36] attains the same object by a series of spiral incisions on the capsule of the tumor, which is always the most resistant part. Lastly, the fragmentary removal of the polyp by a number of conoidal excisions seems to me the best method.[37] It is better to attack the tumor at the fourchette and make our incisions at that level, as advised by Dupuytren.[38] When the volume of the tumor has been sufficiently diminished, it is seized between the branches of wide-jawed forceps (Fig. 144); this compression reduces its size still more; and by

small incisions with the scissors, and torsion, the section of the pedicle is completed.

When the patient is cachectic or enfeebled, it is especially important to employ the most rapid methods and avoid prolonging the anæsthesia or the operation.

After the removal of the tumor it is well to do a supplementary curettage, either at the same sitting or at the end of a few hours, and follow it with cauterization, to cure the metritis, which is constant, and to hasten the involution of the enlarged uterus resulting from the presence of the neoplasm.

Submucous Fibroma of the Uterine Body.—Clinically, we must include under this head those tumors which are separated from the

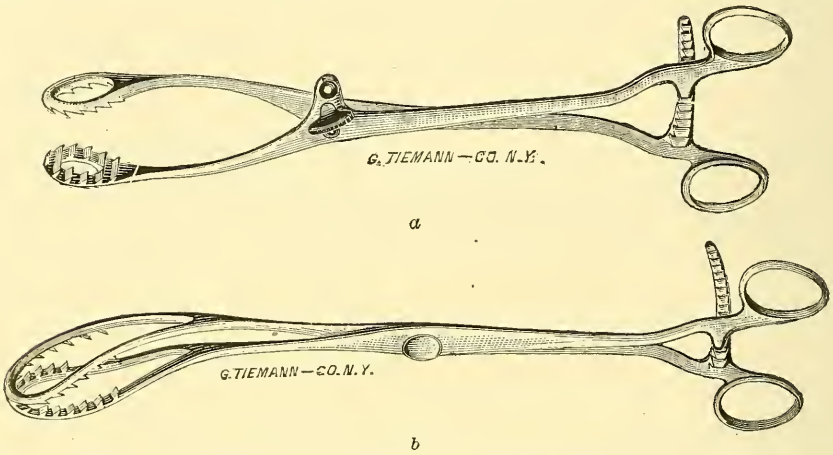

Fig. 144.—Forceps for Removal of Large Tumors. *a*, With adjustable joint; *b*, pickerel toothed.

mucosa by a layer of muscular tissue, for they are more closely related to this surface than to the peritoneum, and cause a decided projection into the cavity of the organ. At certain times, during menstruation, or metrorrhagia accompanied by colic, the cervix is more or less obliterated and opens enough to allow the finger to pass upward to the projection of the tumor. Artificial dilatation, in default of the natural, permits us to appreciate the conditions present. An urgent indication for immediate interference is the commencement of gangrene.

The loose connection of the tumor with the uterus, and the many times repeated example of spontaneous expulsion by natural effort alone, should lead the surgeon to attempt enucleation. This idea was first advanced by Velpeau,[39] but it was Amussat who did the first op-

eration, and made it his own by the zeal and talent with which he defended it;[40] since then it has been performed by Boyer, Berard, Maisonneuve, Lisfranc, and others. But after a momentary favor it fell into discredit and was done only here and there in isolated cases; the criticisms of Jarjavay and Guyon contributed powerfully to this result.[41] But while its fortune declined in France, it improved elsewhere. Atlee[42] recommended it in America as a means of curing "tumors till then considered beyond the resources of art." In England and Germany also Amussat's operation was practised for a long time,[43] though it continued to have its warmest partisans in America. It was but little practised in France, when my fellowship thesis called attention to it anew, and brought out new observations,[44] but the progress of laparatomy has almost entirely directed surgeons to the intra-peritoneal methods (hysterotomy, castration), up to the recent reaction in favor of the vaginal operation of Péan and his admirers.[45]

According to Schröder, the volume of the tumor which may be removed by enucleation is that of the fœtal head at term; the only other case is where the neoplasm descends the greater length of the vaginal canal.

We shall see, however, that morcellation of the tumors permits us to reach much higher up the vagina; and it is only when the tumors are very small that we practise enucleation alone.

Narrowness and rigidity of the vagina form a sufficient contra-indication in certain cases; these can often be overcome by tamponing.

In the absence of spontaneous dilatation of the cervix, we use laminaria tents or Hegar's bougies with preliminary bilateral incision. Chrobak prefers multiple incisions, which he carefully sutures after the operation. If the tumor surpasses the size of the fist, we do not attempt to enucleate it entire, but remove it preferably in small portions.

The operation varies considerably with the volume, the consistency, and the connections of the fibrous tumor.

The most convenient position is the dorso-sacral, but certain operators prefer that of Sims. Anæsthesia is necessary. Two assistants hold the legs of the patient, the one depressing the uterus from above the pubes, the other keeping up continuous irrigation, each of them holding one of the retractors. It is well to have another assistant, as the operation is particularly fatiguing.

When the cervix is not sufficiently dilated, there should be no hesitation in splitting it up to the vaginal insertion, after having ligated

the lower branches of the uterine artery (p. 114); this is the preliminary step.

If the tumor is small and the cervix is not too much thinned to sustain the traction, forceps in one or the other lip render valuable service in drawing the organ down and furnishing a point of support for the enucleation.

Fig. 145.—Pozzi's Enucleator.

The first step consists in opening the capsule. The projecting part of the tumor is seized by a Museux forceps, and at the point where the mucous membrane is reflected on to the uterus an incision is made with a bistoury or scissors to as great an extent as possible.

The second step consists of peeling the capsule from the tumor with the fingers; a spatula is sometimes necessary for this purpose. It should be dull and slightly concave; I have devised an enucleator in the form of a large spoon with which I have obtained good results (Fig. 145). I prefer the enucleator of Sims to the toothed spoon of Thomas.

When the adhesions of the fibroma have been destroyed over a certain area, the Museux forceps are reapplied, and with these or double hooks the tumor is rotated on its axis; if it is necessary, curved scissors may be used to divide the fibrous bands which do not yield to the enucleator.

The third step, or removal of the tumor, is not so laborious as it is extensive. I have removed in mass an intra-uterine fibroma larger than the fist, which was not in a capsule, but free in the uterine cavity, where it had formed adhesions. It was in a very curious case of polyp with intermittent symptoms which had not been removed, though frequently coming down into the vagina, and which finally was retracted into the uterus, where it became secondarily fixed.[46]

Frankenhauser has invented for the extraction of large tumors a special instrument resembling the cephalotribe, and Martin a kind of tongs with a forceps joint. P. Segond has an instrument which permits the extraction of part of the tumor as a core (Fig. 146). C. Braun uses a cranioclast to reduce the size of voluminous tumors.

When the fatigue of the operator or the debility of the patient

has made it necessary to arrest the operation before it is completed, the spontaneous elimination of the tumor has been observed at the end of a few days, and sometimes a second operation is far less difficult, owing to the infiltration of the capsule and the relaxed adhesions. This latter fact has given the idea to certain operators of spreading the operation over different sessions (Matthews Duncan,[47] Marion Sims). But this is to make a matter of choice of what should be only a condition of necessity, and expose the patient to the septic accidents which have so often followed such treatment. There is another variety of operation in two sessions, where the first consists merely of a deep incision of the capsule, after the example of Atlee;[48] then after some days, when we may suppose that the uterine contractions have produced a partial separation of the tumor, we may proceed to enucleation. Vulliet[49] has recently perfected this procedure of Atlee.

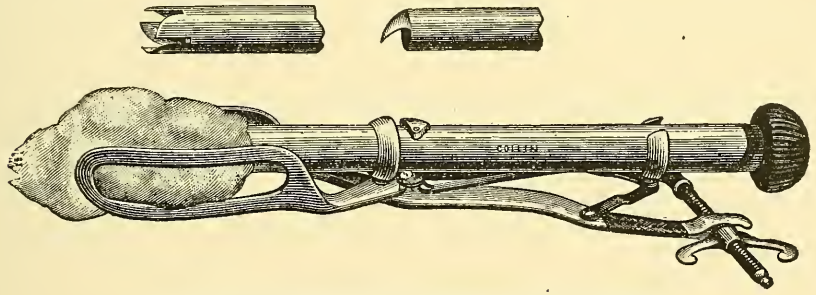

Fig. 146.—Segond's Trephine for Morcellation of Fibroids.

He attempts, a little theoretically, to direct the fibroma at its first appearance toward the uterine cavity, rather than toward the abdominal, by the aid of a galvanic current; then, when it has become submucous, the capsule is incised and ergot and electricity are employed to increase its tendency toward self-enucleation, and to this are added intra-uterine tampons of iodoform gauze, renewed every forty-eight hours.

The objections to this method are its extreme slowness, the many dangers to which it exposes the uterus, and the uselessness of long temporization with a tumor which has become accessible to operation.[50]

If it is impossible to remove the whole of the tumor without dangerous violence, we may leave a portion of it, hoping that by antiseptic treatment (iodoform tampons and intra-uterine injections, etc.) we may prevent the septicæmia which might be caused by gangrene of the portion left in place; but incomplete removal has

given rise to serious disaster when antiseptic precautions have not been observed. Although the result may at any time be disappointing, we may still hope to realize one of the following effects: either the spontaneous expulsion,[51] more or less tardy, or the retraction and atrophy of the intra-uterine portion.[52] After the enucleation of intra-uterine fibroma, there is left a large bleeding cavity containing loosely attached portions of capsule of tumor, in a more or less completely relaxed uterus. All loose pieces should be removed from the wound, and hot antiseptic injections employed. On account of the large absorbing surface, it is better to use a solution of carbolic acid, one to fifty, rather than bichloride which may cause toxic syptoms. If there is much oozing, the temperature of the injections should be raised to 120° F. (50° Cent.) and the cavity may be packed with iodoform gauze. A hypodermic of ergotin, with massage over the hypogastrium, will bring on uterine contractions. Then several layers of cotton and a bandage are applied, and the patient ordered absolute rest.

The principal accidents of enucleation are hemorrhage, wounds of the uterine wall, inversion of the uterus, and septicæmia.

For the hemorrhage the best remedy is rapid completion of the operation, for the retraction of the uterine walls will stop the bleeding. If necessary we may compress the abdominal aorta and tampon the uterus.[53]

Perforation is not very serious unless there is septic infection of the cavity, without which an adhesive peritonitis closes the wound as after vaginal hysterectomy.

Inversion of the uterus may be produced during the operation from excessive traction. It renders the tumor more accessible to the manipulations of the surgeon, but is dangerous if unrecognized, for it may lead our efforts in a false direction. After the operation, the thinness of the uterine wall where the tumor was situated may produce a consecutive inversion; Bischoff[54] in such a case produced a gradual reposition by tamponade.

Septicæmia, with its different local manifestations, metro-peritonitis, thrombosis, etc., may follow when there is a large cavity without much retraction of the uterine wall; it is then necessary to employ repeated antiseptic injections. A permanent drainage tube of rubber made in the shape of a cross may be left in the cavity, where it is retained without exercising pressure (Fig. 52).

Where the secretion is very abundant and putrid, continuous irri-

gation may be employed, the flow being only drop by drop. This weak current may be regulated with the aid of Schücking's ingenious apparatus fitted to the discharge tube of a container full of carbolic acid, one to fifty, and attached to the drainage tube (Fig. 56).

As West[55] and Gillette[56] have remarked, it is impossible to obtain an exact idea of the gravity of this operation from statistics; for some concern only successful cases, others include very different kinds of operation, complete and incomplete enucleations, those divided over different sessions with tumors gangrenous or otherwise, with or without antiseptics, etc.

Moreover, the word enucleation does not have the same meaning with different authors. To judge correctly of this operation, as of all others, we should have a series of individual cases from surgeons of an average skill, established by homologous observations. If such information is lacking, we must content ourselves with the scattered notices, some of them incomplete, accumulated in the medical periodicals. Thus, in 1875[57] I published 64 cases, with 16 deaths, that is, 25%; Gusserow[58] collected 154 cases since Amussat's, up to 1877, with 51 deaths, that is, 33%; Lomer,[59] who restricted his inquiries to the antiseptic period (from 1873 to 1883), found in 130 cases 18 deaths, that is, 16%. Adding to Lomer's statistics several more recent cases, Gusserow collected 153 cases, with 23 deaths, or 14.6%; from this it appears how greatly the fatality of the operation has been lessened by antisepsis. A. Martin[60] has published personal statistics which have an unusual value because of his skill, and the opportunity he has had in a large practice to compare this operation with others done through the abdomen for analogous cases. In 27 operations he had but 5 deaths, of which two were from wounds of the peritoneum and peritonitis, two from septicæmia (before the antiseptic era), and one from collapse. Martin declares that he has entirely abandoned vaginal enucleation for tumors of the body of the uterus, even though they are in partial expulsion; preferring extraction through the abdomen, where he makes an actual enucleation, as far as the integrity of the uterus is concerned, as we shall see farther on.

I agree with Martin in thinking that it is wrong to carry the vaginal operation too far; tumors which reach to the umbilicus should certainly be removed by laparatomy. Nevertheless, enucleation, with or without morcellation, remains a valuable and relatively benign resource for fibroma of the cervix or the lower portion of the uterine

body, which do not exceed in size the fœtal head, and where the cervix has already begun to dilate.

Trans-vaginal Enucleation.—If the myoma starts from the supra-vaginal portion of the cervix or the posterior surface of the uterus, it may make the posterior wall of the vagina prominent to such a degree that the most direct way to reach it is by incision of that wall; less often the incision may be made through the anterior vaginal pouch. In these cases the most rational operation is free incision of the vagina. This procedure may be relatively simple when the tumor is posterior, for it is then developed in the pelvic connective tissue outside of the peritoneum. Czerny[61] reports many successful cases with this method; Ljocis and Olshausen[62] have published similar cases. Le Fort[63] reported a curious case where the recto-vaginal septum was split from above, simulating rectocele, by a pedicled fibroma whose enucleation through the perineum was followed by cure. Marc Sée on this occasion cited a similar case without a pedicle. Eugene Böckel,[64] in a case where the fibroma was accessible through the vagina, made a median incision through that canal and the cervix, posteriorly, and successfully enucleated the tumor.

When the tumor is very large, both morcellation and enucleation may be required. When the fibroma projects both toward vagina and peritoneum, the serous membrane may be opened, which complicates the operation and renders it more grave; many such cases have been followed by peritonitis, with a fatal termination,[65] but there are other such cases which were successful.[66]

Morcellation or Vaginal Myomotomy.—The difficulty of enucleating the tumor when it is of large size or is closely connected with the uterine tissue on the one hand, and the gravity of opening the abdomen compared with the vaginal method on the other, have led surgeons to remove large tumors in successive fragments by the vagina through the partly effaced cervix, either by natural dilatation or by incision.

Emmet,[67] in America, has devised, under the name of "extraction of fibroma by traction," a procedure which he has practised since 1884. His object is to produce a pedicle by traction on the tumor, which he then removes by a combination of morcellation and enucleation, but he describes his technique in so incomplete a manner that it is difficult to form precise ideas about it. The isolated cases of Czerny and other German surgeons lack quite as much definite synthesis and method.

On the other hand, this criticism cannot be made of the technique which Péan has made known even in the smallest details by a series of publications which have been collated by Sécheyron.[68] The fundamental idea of this method is the employment of morcellation from the first, without the addition of enucleation. Instead of attacking the tumor at its periphery, the surgeon begins immediately upon the central portion and, after that is fully excised, finally reaches the fibrous shell: moreover, Péan's method includes a special preliminary operation of splitting, and, at the same time, excising the cervix to obtain easy access to the fibroma.

The cases to which morcellation by the vagina may be applied comprise not only submucous tumors of the size of the infant or adult head, but also cases of interstitial and subperitoneal tumors for which laparatomy might be fatal because of the large opening made in the serous membrane. In certain cases, moreover, Péan has completed the operation by total ablation of the uterus either by the vagina or through the abdominal walls.[69] That seems to me an exaggerated extension of the operation which may be dangerous; the weak point in the procedure is in the difficulty of determining the limits to which we may go, and in the possibility of needing to do a hysterectomy after having already performed a laborious operation.

The operation is divided into three steps: 1. Freeing the cervix from its vaginal attachments. 2. Section of the cervix and a segment of the uterus at the level of the tumor; 3. Removal of the tumor by small pieces, with or without enucleation; and excision and suture of the lips of the cervix.

For this operation, Péan uses a series of forceps either straight or curved, with long jaws, flat, toothed or not, without points, round or blunt, especially designed for morcellation (Figs. 148 and 149); and, lastly, he is provided with long- or short-handled forcipressure forceps. The preliminary steps are the same as those of all gynæcological operations.

The patient is placed in the left lateral or dorsal position. Besides the two assistants at right and left of the operator, a fourth is placed on a foot-stool on a little lower plane, to help in holding the retractors.

First Step—Liberation of the Cervix.—Two or three elbowed retractors display the cervix at the bottom of the vagina; this is immobilized with strong Museux forceps; a circular incision is made with a bistoury at the level of the vaginal insertion, hæmostatic for-

ceps being placed upon the bleeding vessels as necessary. It is at this point in the operation that the forceps are the most necessary, for, before completing it, it is necessary to stop the bleeding entirely. When the cervix is free enough above, it is cut almost through with a bistoury in order not to wound either bladder or ureters; it is then very movable, swinging as freely as the pendulum of a clock.

In this part of the operation we must take care not to wound the peritoneum, though that accident has not the gravity which has been attributed to it: in some cases even, according to Péan, it is advised to make this perforation in order to reach a fibroma projecting into the cul-de-sac.

Second Step—Incision of Cervix and Segment of Uterus below Fibroma.—Long, straight scissors with blunt points are introduced into the cervical cavity, and a clean bilateral incision is made. A Museux forceps is then placed on each one of the lips, anterior and posterior. The finger introduced into the cavity determines the exact seat of the tumor and the point where it is most easily accessible, which is distinguished from the uterine wall by its white or violet color and its density. During this examination the organ should be drawn well downward.

Third Step—Fractional Excision of the Tumor.—The tumor projects toward the cavity of the uterus, the peritoneum, or the vagina; it is drawn downward by steady traction with a Museux forceps, or by long forceps with flat teeth fenestrated or furnished with points (Figs. 148, 149). The elbowed retractors are then introduced, the large ones into the vagina, and smaller ones into the uterus, displaying the operative field as widely as possible. These retractors not only make the part accessible, but also form a valuable means of controlling the hemorrhage by the pressure and traction which they exert. If necessary, an electric light may be used to illumine the part operated on.

The fibroma is fixed by the finger, seized with the forceps, and drawn strongly down. A piece of it is then grasped by a strong-toothed forceps, and a deep incision perpendicular to the long axis of the tumor is made; each of the lips of the section, or perhaps but one of them, is grasped as high as possible with a strong-toothed or pointed forceps and the subjacent parts excised. Before the first forceps is removed, a second pair is passed above it, grasping a new portion of the myoma, and the scissors or the bistoury cut out the part below; thus by the aid of the forceps, bistoury, and scissors the tumor is excised portion by portion (Fig. 147).

The bistouries which Péan uses are of special make and very strong, resembling metacarpal knives, either straight or curved on the flat, and with long handles.

Very often the procedure is simpler; the tumor may not bleed, and then the forceps are used only to draw down different parts of it, the portions between its jaws being cut out in turn. This excision is practised alternately first on one side of the tumor, then on the other; and as the operation progresses the traction allows us to remove larger fragments, which may be as large as a nut, or even as an apple.

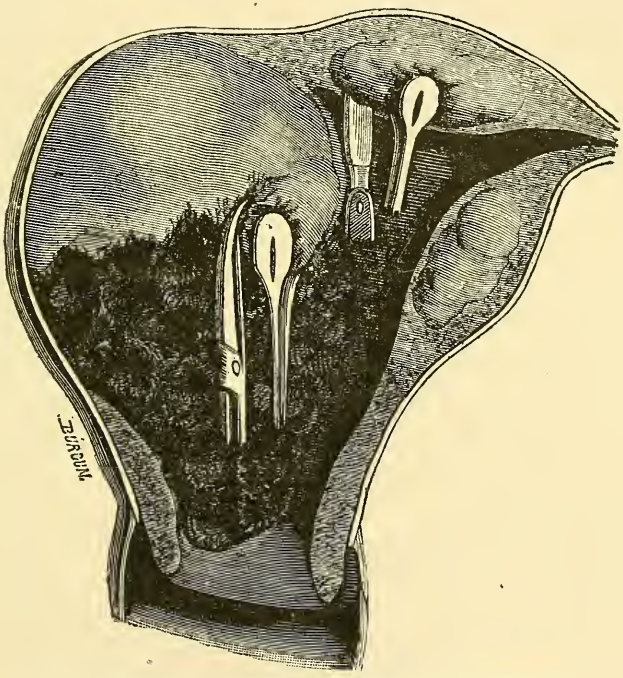

FIG. 147.—REMOVAL OF FIBROMA BY MORCELLATION (AFTER PÉAN).

Thus successive fragments are removed, the operation lasting perhaps an hour.

When the lower part of the tumor has thus been removed, it is often possible by traction and rotation to produce spontaneous expulsion of the upper portion, which will shorten the time of operation considerably. The volume of the mass enucleated by traction alone may exceed that of the portion excised.

When the fibroma is of large size, the intra-muscular cavity which held it is almost always widely opened, communicating with the interior of the uterus and the peritoneum, and bleeding so freely that

the important vessels require ligation. This step of the operation demands the dissection of almost the whole lower portion of the uterus, and its infra-traction almost to the vulva; to facilitate this, Péan excises the two cervical lips, and sutures them afterward to the

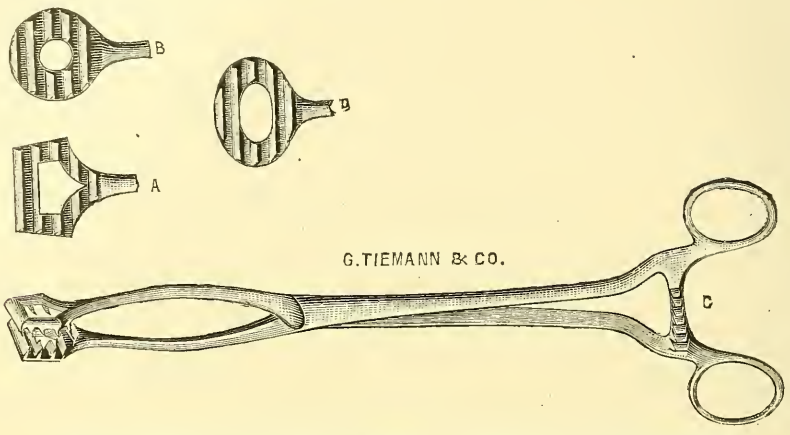

Fig. 148.—Dentated Cyst Forceps which may be Employed for Morcellation.

lips of the vaginal wound with metallic sutures. As to any communication with the peritoneal cavity, Péan leaves it open if its edges are much contused, though he narrows it by a few sutures at separate points.[70]

It is easy to determine when the myoma has been completely ex-

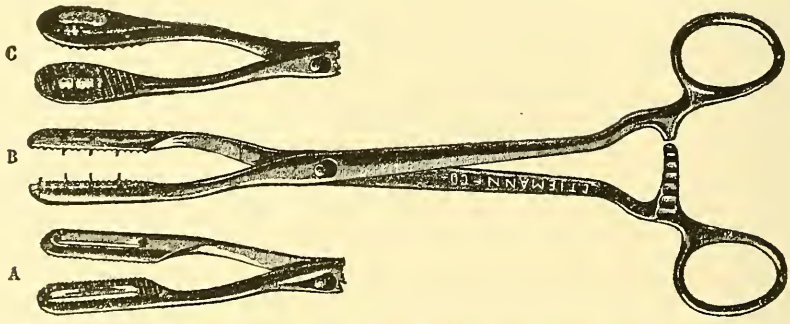

Fig. 149.—Péan's Forceps, Serrated and with Teeth, for Morcellation of Fibromata.

tracted, for the last portions present a convex, smooth, and red surface, covered with cellular débris. The operation is not complete until the state of the adjacent uterine tissue has been examined by the finger. If another myoma is found near the first, it should be at once removed; for this purpose a larger incision of the uterus may be made with a bistoury if necessary. The second tumor is then strongly

grasped with forceps and removed as before. Thus the operator may be obliged to extract a series of small tumors hidden away in the parenchyma.

Fourth Step—The Uterine Toilet and Suture of the Cervix.—As the tumor is removed it leaves a large pocket which communicates freely with the uterine cavity; from this hang the hæmostatic forceps with long handles to the number of twelve to twenty. During the operation Péan uses small sponges provided with long handles to cleanse the walls of the part and find the bleeding points; I replace these with pledgets of absorbent cotton. The last step of the operation is the thorough cleansing of the wound; the smaller clots are removed, and between the forceps left to control the bleeding (from ten to fifteen) it is well to pack strips of iodoform gauze. Intrauterine irrigation with hot antiseptic fluid should precede the application of these tampons, and after thirty-six to forty-eight hours the forceps are removed. Where the tumor is small the operation may be finished by suturing the lips of the cervix. During the first days after the operation it is well to give small doses of ergot.

It is difficult to pronounce upon the gravity of this method. Péan has not published his whole statistics; Terrillon,[71] with five operations, succeeded five times; Bouilly had four out of five successful cases; in the single case where I performed it I obtained a cure. It seems to me certain that this bold procedure ought to give excellent results whenever the tumor, though of large size, is submucous or interstitial and furnished with a capsule which permits us to limit the operation by a clean extraction of the upper part of the fibrous sphere. But if one attacks a subperitoneal tumor, either at the outset or secondarily, which is intimately fused with the uterine parenchyma, so that nothing marks the boundary between the pathological and the normal tissue, it is plain that the operation may become very grave and lead to a fatal hysterectomy by the vagina performed under unfavorable conditions. Mikulicz,[72] after inverting the uterus at an operation, resected a portion of its wall to remove a tumor of this kind, then sutured the peritoneal wound with catgut for a distance of 10 cm., and finally returned the organ to its place; the patient recovered; but this case of bold surgical skill should hardly establish a precedent.

It is not enough that an operation should be possible, and at the same time produce brilliant results, to make it advisable; it must also be decidedly preferable to other operations of a less serious

nature which may be performed in the same case. In the absence of comparative statistics it does not seem probable that fractional excision of large myomata by the vagina is simpler and less dangerous than hysterectomy or enucleation by the abdomen (Martin). Possibly the surgeon's own preferences would decide the question.[73]

Vaginal Hysterectomy.—Total ablation of the uterus for fibrous tumors has been advised in two different conditions: 1. In case of small simple or multiple tumors, which are the cause of grave symptoms. 2. In the case of large tumors when, at the end of an operation for their fractional removal, it becomes evident that a portion of the uterine wall requires excision. In the latter case it is an operation of necessity. In the case of smaller tumors, on the contrary, hysterectomy is not a necessity and has but few partisans, the majority of surgeons preferring, I think, a less serious operation, namely, castration. It seems here again that individual tendencies preponderate; thus, for example, Péan performs vaginal hysterectomy, which he calls "uterine castration," for the very cases where another would perform an abdominal hysterectomy, and still another an ovarian castration. As a matter of fact the three operations have equal chances of success in the only case where there is any hesitation between them, namely, in small multiple fibromata of grave symptoms.

Although colpo-hysterectomy had already been done by Kottmann,[74] Péan[75] was the first to perform it in France systematically. Demons[76] has also advocated it. Successful cases have been published by Sänger, Orthmann, Richelot, Terrier, Späth, and Leopold.[77] According to Gavilan, in 40 cases of vaginal hysterectomy there were 2 deaths; that is, 14.29%. Leopold in 17 operations had but 2 deaths; 11.7%.

The operative technique is that which I describe for the same operation in cancer, with but this difference, that fractional excision does not offer any risk of infecting the wound, the neoplasm, except at suppurating or gangrenous points, not being septic. To facilitate removal of the tumor, a part of it may need extraction, the vagina and vulva may require to be dilated previously (Péan), or the perineum may require incision (Mikulicz and Leopold), which is repaired with care at the end of the operation. If hysterectomy is performed, it must be absolutely complete, without leaving any portion of the uterine tissue adherent to the broad ligament; decomposition of such portions has caused death by septic peritonitis in one of Terrier's cases.[78]

This method of treatment, it seems to me, should be reserved for cases where the uterus is relatively small but exerts pressure on im-

portant organs, and may be extracted without much effort by the natural passages, with easy ligature of the broad ligaments. It is only in such conditions that the operation is benign and may be substituted for abdominal hysterectomy. More definitely, I would advise colpo-hysterectomy where the uterus does not exceed the volume of the fist, and also in the following circumstances: 1st, Hemorrhage threatening to become rapidly fatal; 2d, serious compression (ureter, bladder, nerves, rectum) exerted by a small pelvic fibroma, upon whose development the indirect action of castration would not soon enough exert sufficient influence. In all other cases, if the tumor may not be enucleated by the vagina or the abdomen, I prefer castration in case of hemorrhage and abdominal hysterectomy when the size and connections of the tumor demand its complete extirpation. In spite of the undeniable dangers of laparatomy a simple abdominal hysterectomy is always less serious than a protracted vaginal hysterectomy. (The operation with resection of the sacrum may prove advisable with many pelvic fibrous tumors, for which hysterectomy was formerly practised. For the technique of the operation, which in gynæcology has been applied chiefly to the treatment of uterine cancer, I refer to its own special chapter.)

Destruction of the Fibroma through the Vagina.—I include under this title several operations which do not belong in the previous categories, but which should nevertheless be described, though only as a matter of history:

Partial Destruction by Incisions.—Baker Brown [79] has attempted to copy the natural processes which at times cure the fibroma by gangrene and consecutive elimination. His method is as follows: Incision of the capsule; introduction into the depths of the tumor of special scissors cutting on their outer edge, and dilaceration of the morbid mass or ablation of a conical fragment; or perforation by a kind of trephine.

Partial Destruction by Cauterization.—Greenhalgh,[80] with the same object, opened the capsule with a hot iron, establishing suppuration, removing débris by the hand; in case of retro-vaginal tumor he pierced it in different places with the hot iron over the projecting portions; in two cases out of three death followed from peritonitis.

In the case of tumors which seemed inaccessible, above the pubes, Kœberlé [81] has dilated the cervix and made a series of parallel incisions into the tumor, filling them with enough perchloride of iron to determine the mortification of the intervening portions.

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CHAPTER XI.

TREATMENT OF FIBROUS TUMORS OF ABDOMINAL EVOLUTION—MYOMECTOMY AND HYSTERECTOMY.

Hysterectomy, or removal of fibromata by way of the abdomen, is not an operation that was deliberately premeditated, but is the product of diagnostic error. After opening the abdomen to remove a tumor presumably ovarian, it has occurred that the surgeon found himself confronted by a fibrous tumor of the uterus. The first who committed this mistake recoiled from the terrors of an unknown operation, and hastily closed the abdomen without finishing. These were the cases of Lizars in 1825, of Dieffenbach in 1826, and more recently of Atlee (1849–51), Baker Brown, Cutter, Deane, Mussey, and Smith. Fourteen cases of this kind were published during this period, of which five were followed by death.[1] Then certain bold surgeons ventured to extirpate subserous pedicled tumors, Granville in 1837 being unsuccessful, and the cases of Atlee and Lane recovering. Clay and Heath in 1843 and Burnham in 1853 were the first to undertake the partial extirpation of the uterus; G. Kimball[2] was the first to propose hysterectomy for an interstitial fibroma which was the cause of violent hemorrhages; the patient recovered. Kœberlé[3] was the second to do the operation, but the exact determination of the diagnosis, the rational choice of an operative technique, and the absolute novelty of the subject in Europe gave exceptional value to his case. The report which he published on this occasion made the operation the fashion of the day.

Kœberlé was the first to employ the metallic loop and ligature-tightener for ligating the pedicle. This was a great advance over the former practice of tying the tumor in mass with thread, a method which exposed the patient to great risk of hemorrhage: the first step was thus taken, and from that time the cases multiplied. In the year 1866, Caternault, a pupil of Kœberlé, published a series of forty-two cases of amputation of the uterus and twenty cases of gastrotomy for the extirpation of pedicled tumors. Many of the operators replaced Kœberlé's ligature-tightener by a clamp, which they allowed to re-

main like a vice about the pedicle—an inferior method. After the operation was made known, Péan obtained great success with it in Paris in cases which were considered unfit for major abdominal operations, and where even ovariotomy appeared bold. The presentation of a successful case at the Academy of Medicine (August, 1870), and three years later the publication of an important work[4] where the rules for operation were established with a precision up to that time unknown, bound the name of Péan[5] to hysterotomy with extra-peritoneal treatment of the pedicle. The technique consisted chiefly in the employment of forcipressure, which Kœberlé was the only one to use freely at that time; in fractional excision of large tumors, after the application of a metallic ligature, to avoid opening the abdomen too freely; and in transfixing the pedicle with sharp needles placed crosswise below a steel-wire ligature applied by Cintrat's ingenious tightener. This technique, of which the latest improvements have still retained the general features, was for a long time adopted by all operators in France and elsewhere. It is, then, to these two French surgeons that the merit belongs of having established the operation upon a scientific basis.[6]

After this first stage in the progress of abdominal hysterotomy, marked by metallic constriction of the pedicle, and followed by many arguments and disputes,[7] there was a second stage characterized by the application of antisepsis to the operation as to all others in surgery.

Finally, a third phase was inaugurated by perfection of the technique, and especially by the introduction of the elastic ligature for temporary or final hæmostasis.[8] The most marked feature of the time was the strife between partisans of extra-peritoneal and intra-peritoneal methods, and the substitution of castration for hysterotomy in a large number of cases.

Synonyms.—The term hysterotomy, which means, from its etymology, section of the uterus, is essentially comprehensive; with the adjective abdominal, it may be applied to every operation where the uterine tissue is removed after opening the abdomen. Still another word may be employed for the sake of precision; thus, supra-vaginal hysterotomy means section or ablation of the uterus above the vagina. Tillaux, in a communication to the Académie in 1889, proposed the word hysterectomy, which conveys the idea of excision, for those cases where a part or the whole of the organ is removed. This more exact term has rapidly prevailed, although the older form is still met with.

The Germans employ the word myomotomy or myomectomy for removal of a myoma with all or a part of the uterus, thus including both hysterotomy for pedicled fibroma and partial hysterectomy for interstitial fibroma. Lastly, by intra-peritoneal enucleation is meant simply incision into the uterine wall to remove a tumor, with preservation of the uterus itself.

General Indications for Abdominal Hysterectomy.—We shall see further on that the possibility of substituting for this always serious operation another which is less grave, namely, castration, reduces in certain definite circumstances the field of hysterectomy. We may thus formulate the indications for the operation:

Rapid growth of the tumor; grave hemorrhage which does not yield to any palliative; ascites produced by the irritation of a very movable fibroma; compression of important organs; very large tumor, and especially its cystic, œdematous, or suppurative degeneration; symptomatic prolapsus of the uterus; pregnancy, when the fibroma will manifestly be a serious cause of dystocia.

The classification which may be established for the abdominal operation is as follows:

I. Pedicled fibroma.

II. Fibroma with a single nucleus.

III. Fibroma with many nuclei.

IV. Fibroma within the pelvis or the ligaments.

In the first class the removal of the tumor is extremely simple and differs but little from ovariotomy; it is here only that the term myomectomy is applicable.

For the second and third varieties we may generally perform partial hysterotomy or supra-vaginal hysterectomy, according to the location of the tumor; in certain special cases we may practise intra-peritoneal enucleation.

In the fourth class, if it is not possible to employ the palliative operation of castration, we should attempt an intra-ligamentous decortication.

Finally, total extirpation of the organ by the abdominal method has been practised for certain multiple tumors which involved the cervix, with hypertrophy of the tissues and no opportunity of saving a pedicle.

Before passing these different operations and their varieties in review, I wish to say a few words concerning an operative manœuvre which is applicable to them all, and which has completely changed

their technical conditions since its introduction into abdominal surgery.

Provisional Hæmostasis during the Operation of Hysterotomy.—Whatever may be the nature of the operation done in the abdominal cavity, it is of the greatest importance to be able to perform it without much bleeding. To obtain this end the older operators employed the compression of the écraseur; Billroth invented an enormous forceps which might be used in such cases (Fig. 48, p. 67). A most valuable means of controlling the hemorrhage is the temporary elastic ligature, which must not be confounded with the permanent ligature to be described further on. Kleeberg,[9] of Odessa, first used the elasticity and steadiness of rubber to procure a constant constriction of the uterine pedicle. He replaced the metallic ligature of Kœberlé and Péan with an elastic tube, leaving it in place permanently, and the patient was cured. But it was Hegar who raised it to its present rank, and Martin[10] who gave a general application to the procedure, so that it now fills in gynæcological practice the place of Esmarch's bandage in general surgery.

For the permanent elastic ligature a thick rubber tube of about 5 mm. diameter is employed in Germany. I prefer a solid cord of the same size, and, after my communication which made it known, it has been generally adopted in France.[11] It has the advantage of being more easily sterilized and, with the same volume, is more resistant. The temporary ligation is best obtained by the same elastic cord. After stretching it and making two or three turns round the part, the crossed ends are secured by a strong pressure forceps; for this purpose Hegar has a special form of forceps, with short-elbowed jaws which are quite convenient. I have invented an elastic constrictor which renders good service when the surgeon is obliged to work in a narrow cavity, and which is far less cumbrous than forceps. Certain operators, forgetting the real object of this instrument, have used it for the purpose of permanently securing the ligature, but this end is best attained by a double thread of silk; the ligator being only employed for tightening the rubber cord. (For the technique see p. 53 and Fig. 44, p. 62.)

I. *Pedicled Fibroma—Myomectomy.*—After the provisional ligature has been applied as low down on the uterus as possible, the pedicle, if thin, is pierced with a needle armed with double silk, whose ends are secured by Bantock's or Tait's knot (Fig. 34, No. 5 and 6, p. 54). If the operator is not familiar with this special knot, he sim-

ply cuts the loop and ties the ends right and left after crossing them by a half-turn (Fig. 34, 3 and 4); to make the surgical knot, the thread must always be passed twice (Fig. 34, 2).

If the pedicle is thick, it is well to seize and compress it with Billroth's clamp-forceps (Fig. 48, p. 67) while the tumor is cut transversely, taking care to leave a collar of peritoneum and capsule about the margin of the wound. The clamp is then removed, and in the furrow which it has traced around the foot of the pedicle a series of silk sutures are placed. The excess of tissue left above the seat of the clamp is then cut away, leaving only enough to cover the wounded surface, that being secured by the sutures already passed and a few superficial points. The provisional elastic ligature is then removed, and if there is much oozing by the sutures a few deeper ones are

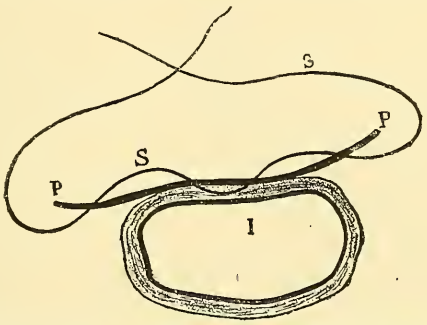


FIG. 150.—SUTURE OF THE THIN FOLD OF PERITONEUM AND FIBROUS TISSUE LEFT AFTER THE DETACHMENT OF A FIRM ADHESION. *I*, Intestine; *P*, peritoneal fold covering the fibroid; *S*, suture.

added. If, at the moment of section, it is possible to see any of the large vessels, they are separately tied.

The pedicle is returned to the cavity of the abdomen only when all oozing is completely arrested; if there is still any fear of further bleeding, tamponing of the pedicle is practised by the method of Wölfler-Hacker described below. With large pedicled fibromata wide adhesions to the intestines may be found with adventitious vascular connections more important than those of the pedicle itself. To detach these adhesions when they are intimate we make use of the procedure recommended by Schröder, leaving adherent to the intestine a superficial portion of the fibroma with its peritoneum, and passing one or more catgut sutures so as to secure the coaptation of the bleeding surface (Fig. 150).

II. Encapsuled Fibroma, with one Nucleus. Intra-peritoneal Enucleation.—Cases of this variety are relatively rare, the most com-

mon form being multiple fibromata, distorting a large segment of the uterus, which seems to be stuffed full of them (Figs. 130, 131, p. 218). To treat each one of these nuclei separately would not be possible, but when the tumor is single, whether formed by a simple or a compound mass, whether interstitial or submucous, it is possible to carry out the plan of removal by enucleation of the neoplasm alone, preserving the integrity of the uterus and its adnexa, and not interrupting the genital life of the woman. This consideration will have some weight when the patient is not near the menopause, but it rarely needs to be con-

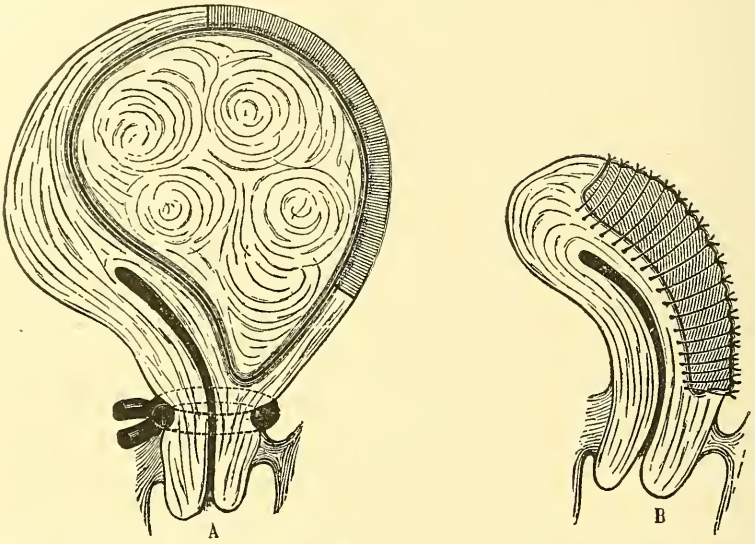


FIG. 151.—*A*, Enucleation of an Interstitial Myoma; *B*, Disposition of Sutures after Enucleation.

sidered. Enucleation, then, may often be considered only a simplification of the operative technique applicable to certain definite cases.

Spiegelberg[12] seems to be the first who employed it; Spencer Wells[13] has practised it for a long while; but it is A. Martin[14] who has especially advocated it.

We begin by drawing the uterus outside of the abdomen upon a layer of gauze sponge, and placing about the cervix an elastic cord with its ends crossed and held in place by forceps or my ligator. Having thus provided for control of the bleeding, the uterus is incised over the most projecting part of the tumor, and this is removed, care being taken not to open the uterine cavity.

As this operation has often been performed for submucous fibroma, which most surgeons prefer to remove by the vagina, the uterine canal has sometimes been opened (10 cases out of 16: Martin); in

these cases Martin closed the mucous wound with a continuous catgut suture.

The incision in the uterine wall is closed by a series of deep sutures taking in the whole extent of the wound. Martin uses for this purpose catgut prepared in oil of juniper, which he has substituted for carbolized silk (Fig. 151).

When the cavity left after the removal of the tumor is very large, Martin uses a cross-drain passed through the cervix into the vagina. Freund,[15] in a remarkable case which was followed by success, where the fibroma was inflamed, replaced the rubber drain by an iodoformized wick, and then tamponed the uterus with iodoform gauze. We may also diminish the tumor cavity by removing portions of its wall.

Martin, in one case, also removed both the degenerated ovaries, and once a single ovary. He recommends castration in all cases where we suspect the presence in the uterine tissue of another fibrous nodule beyond our reach.

In sixteen cases he had three deaths; and once he had to do a secondary vaginal amputation of the uterus because of the appearance of a new fibroma whose origin had been unforeseen at the time of the first operation. The possibility of this second operation is the weak point in the whole method, and for that reason it should always be combined with castration. In this case, however, enucleation fails of its initial object, which is to maintain the genital functions, and becomes simply a particular case of partial hysterectomy with the pedicle left within the peritoneum.

III. *Fibroma with Multiple Nuclei. Supra-vaginal Hysterectomy.*—According to Schröder we must distinguish two different classes; the first, where the tumor is above the adnexa at its lower level, the body of the uterus being intact; and the second where the body is invaded in such a way that the adnexa form a more or less sessile appendix to the tumor.

In the first class the rule is not to detach the broad ligaments, which would render the operation more serious; but as we are never sure that there are no small nodules remaining in the uterus which may develop later, it is prudent to remove the ovaries as the last step. In this way we do not usually obtain as narrow a pedicle as by complete ablation of the body of the uterus, which will be reason enough to reject partial hysterectomy; it is possible, however, to do the operation without opening the uterine cavity which diminishes the chances of infection.

Partial hysterectomy presents no essential difference from supra-vaginal amputation, with the exception that it does not include the detachment of the broad ligament. The temporary elastic ligature is placed below the tumor, which is removed with its capsule, saving only a portion of the latter to make, with the peritoneum and subserous tissues, a collar about the wound. This operation is distinguished from enucleation by the removal of the mass as a whole, and by excising it with the knife; I advise that the operator should always assure himself beforehand by a vertical cut that enucleation is not possible; for when it is, it is preferable.

Supra-vaginal amputation, or hysterectomy, is a typical operation, which we adopt in the majority of cases, either at once or after trying enucleation or partial hysterectomy. Two methods divide the preferences of surgeons; the first, where the pedicle is treated exterior to the peritoneum, to which are attached the names of Kœberlé, Péan, and Hegar; the second, the method where the pedicle is abandoned within the peritoneum, or Schröder's operation, which has been modified by many different authors. Lastly, I shall describe a procedure which unites the advantages of both the preceding with ablation of both uterus and cervix, or the mixed method of total hysterectomy.

Technique of Supra-vaginal Hysterectomy.—The first steps of the operation are identical whether Hegar's or Schröder's operations are performed. The abdomen is rapidly opened through the linea alba without stopping to put forceps upon the little bleeding points. If the tumor is small and chiefly within the lower pelvis, the incision is prolonged nearly to the pubes, but with the precaution of keeping a sound in the bladder. We have always reason to fear a wound of this organ from elongation of it in front of the tumor.[16] To give a little more room below, the muscular insertion on one side or the other may be divided, though I do not advise it.

If the tumor is very large and soft, we should see whether it may be diminished by puncture of a cystic cavity; if not, it is better to prolong the incision to the xiphoid cartilage, if necessary, rather than to attempt the long, difficult, and perilous procedure of fractional excision advocated by Péan.[17]

The uterus must then be disengaged so that the elastic ligature may be put in place, the connections of the bladder with the tumor having been determined by exploration with a male sound. It has happened to good surgeons that a portion of the bladder has been included in the ligature and removed. To avoid such an accident in

difficult cases Albert transfixes the tumor immediately above the bladder with a pin to prevent the ligature from slipping and including part of it.

The broad ligaments are cut between a double series of ligatures which are passed by a blunt, mounted needle (Fig. 19, 2 to 3) either straight and curved a little at the point or similar in form to a Deschamps needle (for technique see pages 53 to 65); the tube and round ligaments should be separately tied. As soon as the upper part of the cervix is free, the elastic ligature is put in place. Some authors advise to go immediately below and search for the uterine arteries by feeling their pulsation or their projection upon the sides of the uterus. For this purpose it is necessary to descend to the folds of Douglas which bound the cul-de-sac of that name, including a certain

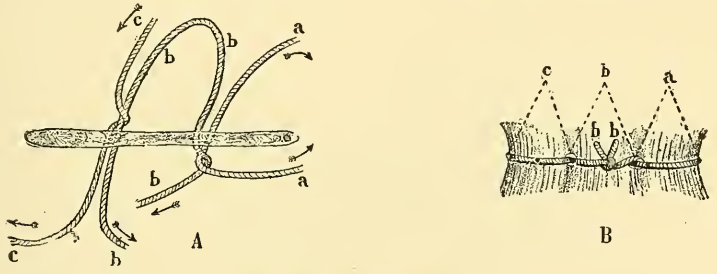


Fig. 152.—Chain Ligature.

portion of the adjacent soft tissues within the ligature. One of the great advantages of the extra-peritoneal method is that it dispenses with this dangerous step.

It is always better to remove the adnexa, though certain operators attach but little importance to neglect of this extirpation, thinking that the tissues will atrophy. Where there are no difficulties caused by extensive adhesions, castration should be performed at the same time, on account of the accidents which have been described, such as pelvic hæmatocele (Péan, Kœberlé) and extra-uterine pregnancy (Kœberlé).[18] When the uterus is sufficiently freed from its peripheral attachments, the elastic ligature is applied to the cervix, and then an antero-posterior incision made a finger's breadth above it, and the fibroma removed as soon as possible by section and enucleation. From this moment, according to the treatment of the pedicle the operation varies.

Intra-peritoneal Treatment of the Pedicle.—I will describe Schröder's technique as it is given by Hofmeier.[19] In proceeding

with the removal of the tumor we should be careful to finish by a circular conoidal incision at least 3 cm. from the ligature and not going more deeply beneath the peritoneum than to slightly pare off this membrane, so that the rim of tissue left is partly serous; with the scissors it is then trimmed so that with slight traction it just covers the whole of the wound; all gaping vessels that may be found are tied with catgut.

An important feature of the operation is the destruction and disinfection of the mucous membrane of the uterine cavity, which is found in the bottom of the wound. There is no doubt that this opening of

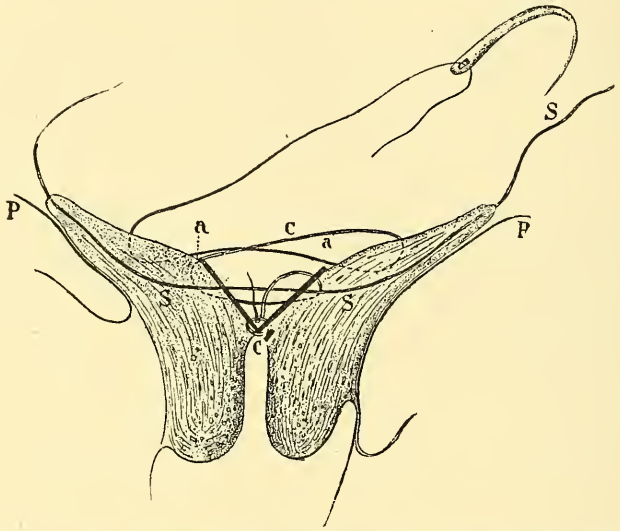


FIG. 153.—SCHROEDER'S INTRA-PERITONEAL SUTURE OF THE PEDICLE. *S*, Deep suture, passed at once under the whole bleeding surface; *C*, continuous suture of catgut in different terraces, bringing together the whole wounded surface whose lower portion is marked by the heavy line *aa*, formed by the cauterized uterine cavity; *P*, peritoneal investment.

the uterus forms one of the unfavorable elements in the intra-peritoneal treatment, since it may be a source of infection; though certain authors, as Martin, for example,[20] ascribe but little importance to it. But Hofmeier, in his analysis of Schröder's operations, has clearly demonstrated this influence (21 cases without opening, 2 deaths; 59 with opening, 18 deaths).[21] It is important, then, to reduce this danger to a minimum both by securing rapid cicatrization by exact coaptation and by completely modifying the membrane adjacent to the wound. For this purpose Olshausen[22] recommends the free excision of the bottom of the wound in the shape of a funnel, dissecting out as much as possible of the mucous membrane. It is well also

to cauterize the bottom of the wound with strong carbolic acid (1:10), or better with the Paquelin thermo-cautery, which should be buried perpendicularly in the cervical canal. We must not, however, cauterize the superficial portions of the wound for fear of preventing primary union.

The next step consists in the application of the suture. Veit and Martin employ juniper catgut; Schröder and Hofmeier use both catgut and silk. If the bleeding surface is not extensive, it is sufficient to pass deep sutures with a strong needle under the whole

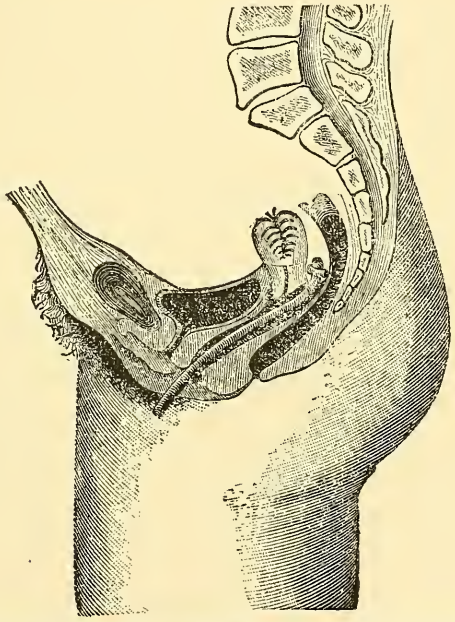


FIG. 154.—VAGINAL DRAINAGE WITH A CROSS TUBE AFTER ABDOMINAL HYSTERECTOMY (MARTIN).

wounded surface, forming thus a series of separate points, which are firmly tied, and completing the junction of the peritoneum by a superficial suture. It must always be kept in mind that exact coaptation is indispensable for complete primary union; the difficulty is to tie tightly enough to obtain it without compromising the nutrition of the tissues.

If the wounded surface is extensive, perfect union of the sides is obtained by the employment of the continuous catgut suture in tiers, or with separate silk sutures, which Schröder originally used. For fear, however, that the catgut will be too quickly absorbed, especially if the tissues are very dense, certain sustaining sutures

of silk are placed at equal distances through the whole thickness of the wound before beginning the continuous suture. These are tied after the continuous suture is finished, but they are put in position beforehand in order not to cut the catgut in passing them. They should be inserted a little obliquely, and not perpendicular to the axis of the wound, that they may not be parallel to the vessels which they are meant to constrict (Fig. 153, Hofmeier). The wound should be closed longitudinally, that is, parallel with the abdominal opening (Gersuny, Fritsch, etc.).

When the suture of the pedicle has been completed by Schröder's method, if a few drops of blood ooze by the side of the suture, after the elastic band has been removed, Martin[23] does not hesitate to pass through the pedicle from before backward a strong needle with quadruple thread, and thus tie it in two portions; in autopsies which he has had occasion to make, he has never seen any trace of mortification from this complementary ligature, which Leopold also employs at times.

After hysterectomy, no matter how simple the operation has been, Martin always practises drainage through the vagina (p. 71). The lower end of the tube is always folded in the vagina and covered with antiseptic gauze to prevent the entrance of germs from the air; it is withdrawn on the third or fourth day, when the patient begins to feel a peculiar uneasiness in the lower part of the abdomen (Fig. 154). This drainage, after simple operations, without destruction of the peritoneum or septic infection, is not generally employed, and seems to me unnecessary.

Extra-peritoneal Treatment of the Pedicle—Hegar's Method.—The abdominal cavity is closed as tightly as possible about the tumor, and this is surrounded by gauze sponges to receive the blood; the incision is then made transversely, two fingers breadth above the elastic ligature. At this moment the fibrous nodules which penetrate the pedicle appear upon the cut surface; they may be enucleated without danger of bleeding, the elastic band compressing the pocket left empty by the small tumor. Bleeding vessels should be separately tied. The surface of the stump is then smoothed and held strongly drawn out with Museux forceps. We then proceed with the toilet of the peritoneum, keeping the pedicle fixed in the lower part of the wound. The temporary elastic ligature may often be permanently retained if it is properly placed, but, if too far down to permit the drawing out of the pedicle, a new one is placed above it and

tied before the first is removed. When the pedicle is very large, it is well, according to Hegar, to tie it in two portions after transfixing it with a double elastic band by means of a special instrument, Kaltenbach's needle.[24] This complication, it seems to me, might be avoided by taking an additional turn of the elastic ligature as Tauffer has lately advised.[25]

In applying the permanent ligature, the greatest care must be taken to avoid the inclusion of intestinal coils or bladder and to see that nothing but the pedicle is constricted.[26] It is applied in the following manner: While an assistant holds the pedicle in place with the Museux forceps, we make two turns about it with the elastic cord in such a way that it is tightly constricted. The ends are crossed and the cord stretched a little. Between the cross and the cervix a ligature of strong silk is applied with the double surgical knot (Fig. 34, 2); then, after gentle traction on the instrument to stretch the elastic cord a little more and give room, a second ligature is applied for security a few millimetres in front of the first. After removing the forceps or the clamp (Figs. 41 and 44), the ends of the silk are then cut short, leaving those on the elastic cord a little the longer.

One of the most important points in Hegar's method is the complete isolation of the pedicle outside of the abdominal cavity. By suturing the peritoneum below the elastic ligature and by non-suture of the immediately adjacent abdominal planes he forms a gutter which surrounds the pedicle so that it remains isolated like a pistil in the centre of a flower. This gutter prevents the pedicle, which is meant to slough off, from being imprisoned within the soft parts and infecting them, and about it we can make topical applications destined to mummify it and keep it aseptic. It is especially in very stout patients that this peculiarity of the technique is of the greatest value.

To suture the peritoneum about the pedicle, Tauffer fixes in the lower part of the abdominal incision a long thread with two ends; each is provided with a needle, and is used to attach the peritoneum to the surface of the pedicle immediately below the ligature, right and left; I prefer to accomplish this with catgut and a single needle (Plate VI., Figs. 1 and 2).

Great care must be taken that only the serous surface is included in this suture, using a very fine curved needle that the punctures may not bleed. It is well in the same suture to attach the stump of the broad ligament on each side to the stump of the uterus as closely as possible. When this peritoneal collar has been applied to the

EXPLANATION OF PLATE VI.

EXTRA-PERITONEAL TREATMENT OF THE PEDICLE AFTER SUPRA-VAGINAL HYSTERECTOMY (HEGAR'S METHOD).

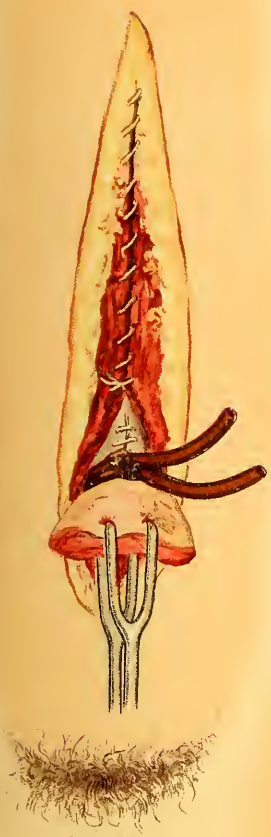
FIG. 1.—The suture of the peritoneum to the lower part of the pedicle is begun; the pedicle being strongly drawn upward so that its distance from the pubes is much increased.

FIG. 2.—Suture of peritoneum about lower portion of the pedicle completed.

FIGS. 3 AND 4.—Suture of abdominal walls above the pedicle. (3) Continuous catgut suture of the peritoneum, and (4) of the musculo-aponeurotic planes.

FIG. 5.—Peritoneum sutured in a ring about the lower part of the pedicle; the stump being strongly depressed to show this suture. Deep sutures for integument in place and superficial ones tied above the pedicle.

For the purpose of demonstrating the arrangement and to allow movement of the stump, the wound is shown with the cutaneous sutures below the pedicle not yet in place.



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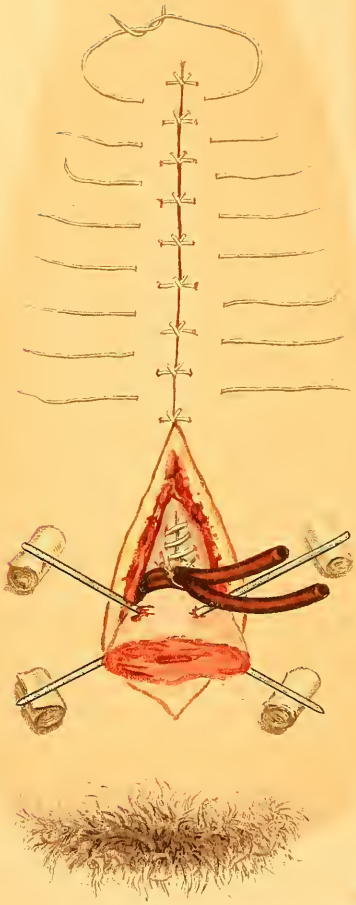

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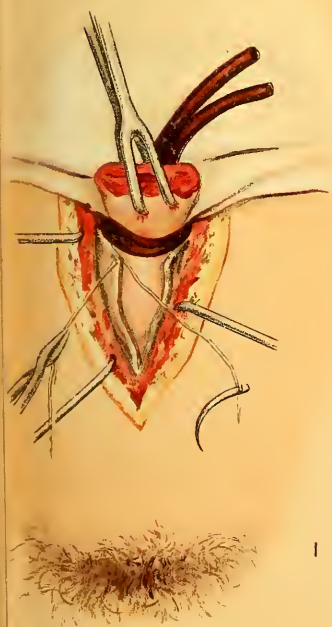

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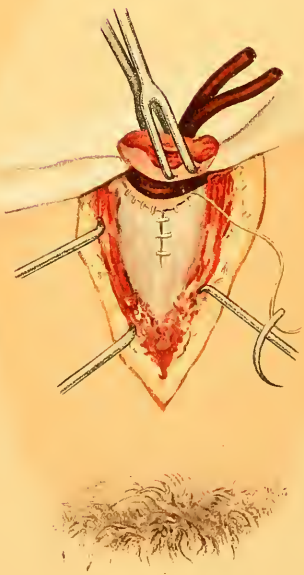

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EXTRA PERITONEAL TREATMENT OF THE PEDICLE
AFTER SUPRA-VAGINAL HYSTERECTOMY.

LINDNER, EDDY & CLAUSS, LITH. N. Y.

pedicle, we may continue the suture of the peritoneum through the whole length of the abdominal opening with the same needle and catgut, adding, if necessary, a few supplementary points. The suture of the other abdominal planes is begun about 4 cm. above the pedicle (Plate VI., Figs. 3 and 4).

To prevent the pedicle from descending too far into the pelvis under the influence of movement, etc., two strong pins, crossing like the letter X, are passed through just above the ligature, and their pointed ends cut off. These pins have the additional advantage of preventing the elastic ligature from slipping. Below their ends small pads of iodoform gauze are placed to prevent their wounding the integument (Plate VI., Fig. 5). Then, with the scissors, the pedicle is trimmed to the shape in which it is to be left, and after surrounding it with wet antiseptic compresses its surface is cauterized with the thermo-cautery.

Hegar, Kaltenbach, and Tauffer dress the wound as follows: A tampon of cotton moistened with a solution of zinc chloride (1:2) is placed over the centre of the pedicle, which is surrounded with cotton which has been dipped in a zinc solution (1:10) and carefully squeezed dry. Over and about this is placed iodoform gauze covered with several layers of cotton and held in place by a flannel body-bandage. This first dressing is usually left in place for from five days to a week, and is then found dry and hard. The tampons of zinc cotton about the pedicle are now replaced by iodoform gauze and the pedicle itself is touched anew with the caustic solution to mummify the eschar and prevent its becoming soft and fetid. This dressing is repeated every day, and if the pedicle is very large the mortified parts are removed little by little with the scissors.

Kaltenbach [27] has recently substituted for the chloride of zinc, which has the disadvantage of making too extensive an eschar and giving rise to capillary bleeding, a dressing of iodoform gauze; but in very fat or very anæmic patients this exposes to the risk of poisoning from rapid absorption in the deep gutter which surrounds the pedicle. Kaltenbach and Hegar have had good results with the mixture of three parts tannin and one part salicylic acid which Freund recommends for use after operation in extra-uterine pregnancy; I substitute, for the salicylic acid, iodoform in the proportion of 1:5 of the tannin, and find the mixture very serviceable. After the operation, as soon as the interior of the pedicle has been cauterized, the gutter about the pedicle is filled with the powder, and then the dressings applied; thus

the part is tanned, so to speak, with no danger of cauterizing the adjacent healthy tissue. The first dressing is left in place from eight to ten days.

This modification is a great improvement, permitting the patient to rest quietly instead of fatiguing her with repeated dressings, and producing the drying up of the entire pedicle, without the need of removing portions of it from time to time with the scissors.

On the third or fourth day after the operation it is not uncommon to see, as after salpingectomy, a slight sanguineous discharge from the vagina; this is of no serious importance.

The elastic ligature and the pedicle with its pins usually fall on the fifteenth to twentieth day, leaving a granulating funnel which should be lightly packed with iodoform gauze; it is sometimes very deep, for the mortification of the pedicle is seldom arrested at the level of the elastic ligature. This cicatrix formed at a weak part often makes it necessary for the patient to wear an abdominal supporter. If the ovaries have not been removed, there is observed at each menstrual period a discharge of blood from the scar. There may even be a persistent cervico-abdominal fistula.

Dropped Elastic Ligature.—Whatever may have been done in this direction by Czerny [28] and Kaltenbach,[29] it was Olshausen [30] who first recommended retention of the elastic ligature. It is applied as for the external method and then sutured about the pedicle with silk thread to prevent its slipping. Olshausen employed this procedure occasionally where the hemorrhage was very difficult to control, yet, though very successful, he has to-day relinquished it.[31] The pedicle thus ligated does not mortify but continues to derive nourishment, either through the base or through adjacent adhesions; its nutrition is, however, very scant, and it undergoes a granulo-fatty degeneration. There have also been cases where it has suppurated and caused serious symptoms with the elimination of the ligature (Hegar) or fatal peritonitis (Olshausen, Czerny, Hegar). At other times the ligature has been expelled without inconvenience to the patient. Ahlfeld [32] cites an instance which the surgeon complicated by fastening the ligature, after having taken two turns about the pedicle, with a ring of lead 5 mm. in diameter, which he crushed about the rubber with strong forceps. This mode of fixing the ligature had already been employed by Thiersch,[33] but only for extra-peritoneal treatment, and was then adopted by Sänger,[34] who later abandoned it for his mixed method after obtaining nine successes without a single failure.

The following procedures are cited only because of their originality:

Schwarz[35] has proposed to cover the elastic ligature with a fold of peritoneum cut from the pedicle.

Meinert[36] has proposed to open Douglas' pouch and pass the pedicle into the vagina; he made the experiment once but the patient died.

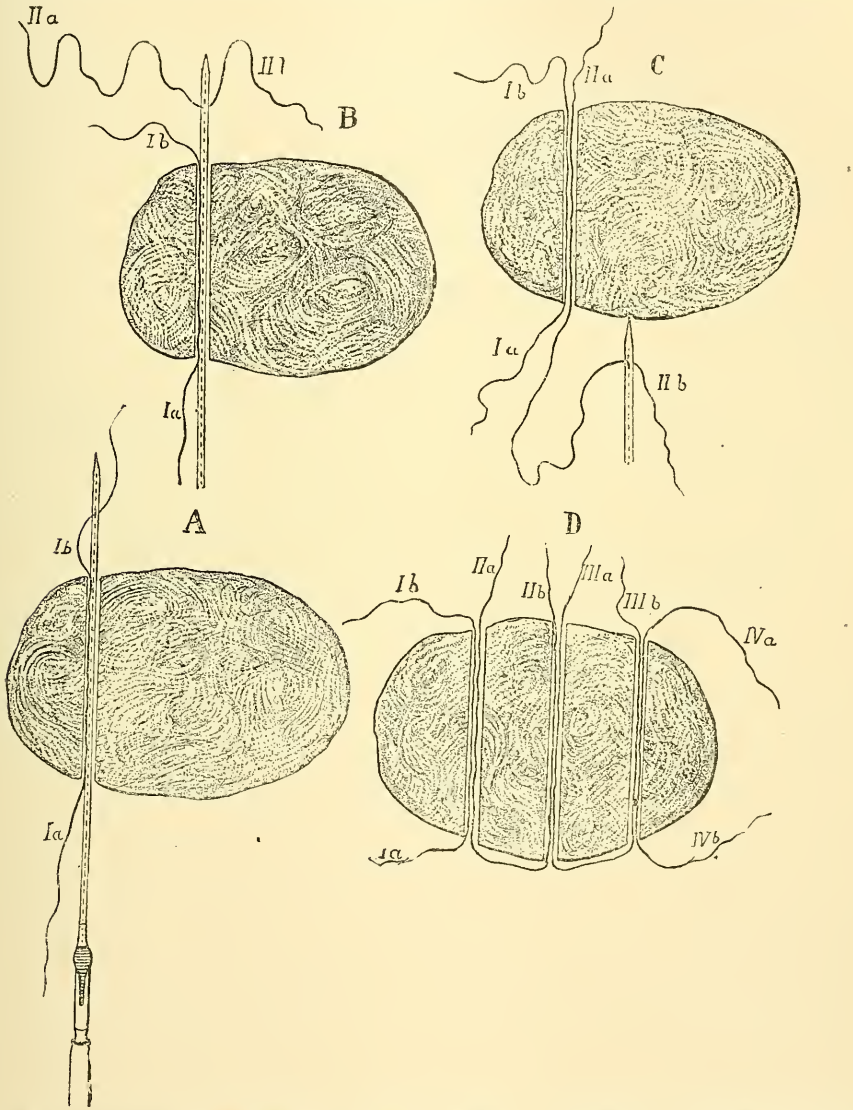

FIG. 155.—LIGATURE OF THE PEDICLE BY ZWEIFEL'S METHOD. *A*, Transfixion of pedicle with needle armed first with threads *Ia* and *Ib*; *B*, first thread withdrawn and second *IIa* and *IIb* passed through eye of needle, which is then withdrawn; *C*, needle re-introduced with thread *IIa* and *IIb* a finger's breadth from the first puncture; this is repeated with the third thread and so on; *D*, pedicle traversed by a series of loops disposed for partial juxtaposed ligature.

Hysterectomy has been performed in two stages; the first consisting in opening the peritoneum and the production of adhesions; the second, of the removal of the tumor. Nussbaum [37] has employed this dangerous method in the case of a suppurating myoma; the patient died. Vulliet [38] has recently adopted it, but his patient, when he published his case, had not recovered.

Continuous Fractional Ligature (*Fortlaufende Partienligatur*). —Under this name Zweifel has described a method of suturing the pedicle which certainly assures better hæmostasis than Schröder's,

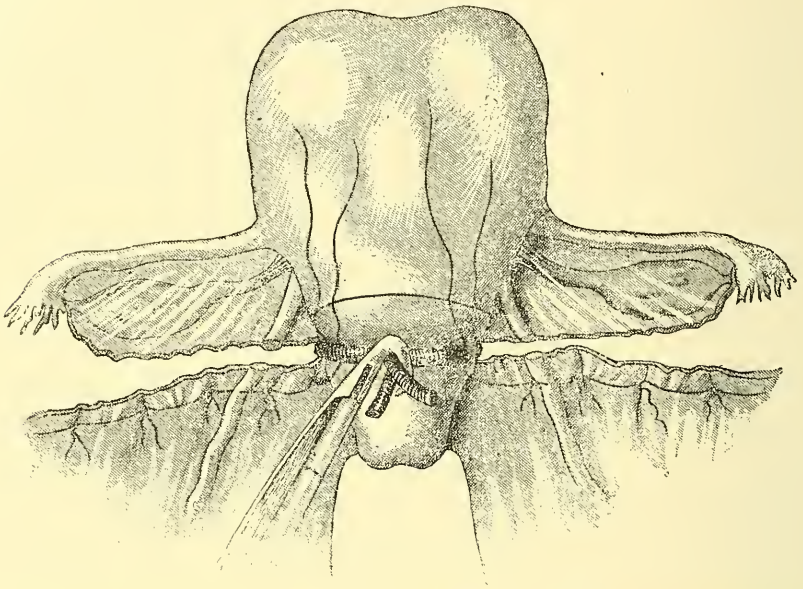

Fig. 156.—Ligature of the Pedicle by Zweifel's Method. Suture of the broad ligament, and application of temporary elastic ligature.

but seems, *à priori*, inferior in technique as regards primary union of the stump and its chances of sloughing; however, the good results published by Zweifel demand attention.

In ten cases with his method [39] there was but one death when he published his book (1888), and in February, 1889, he announced a series of twenty-two successful cases. His technique is as follows: For all his ligatures he employs sterilized silk and a needle furnished with a groove which resembles Reverdin's; the point is blunt. He first ties the broad ligaments with chain sutures. He then divides them and applies the elastic cord, the ligatures nearest the uterus being left long and the elastic cord passed over them (Fig. 156).

In the excision of the tumor a small musculo-peritoneal lip is preserved both before and behind (Fig. 157), and the cavity of the uterus and cervix are cauterized with the thermo-cautery. A sharp needle is then threaded and a series of partial ligatures passed, of which the figure (155) gives a sufficient explanation. The peritoneum is closed by a series of superficial sutures (Fig. 158). Drainage through the vagina by the cross-tube is necessary only when there is persistent oozing.

Mixed Method (It might also be called juxta-parietal).—Owing to the difficulty which some surgeons have found in fixing a short pedicle in the abdominal wound, it has been abandoned within the cavity

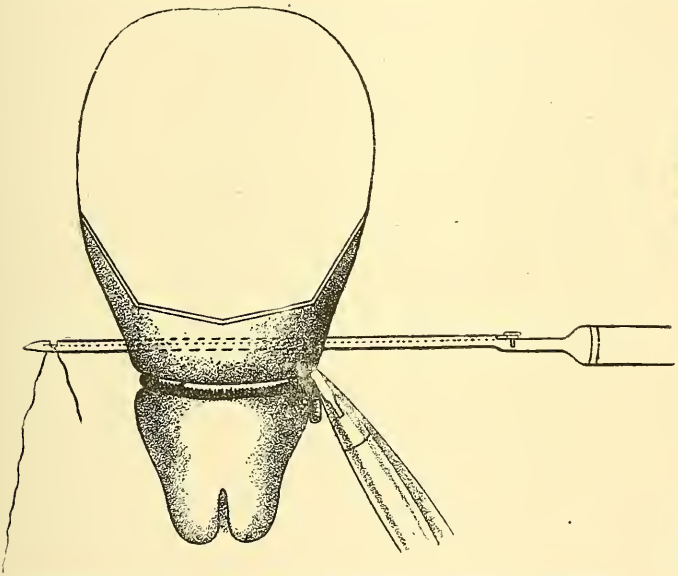

FIG. 157.—LIGATURE OF THE PEDICLE BY ZWEIFEL'S METHOD. Showing the form of the incision by which the pedicle is formed.

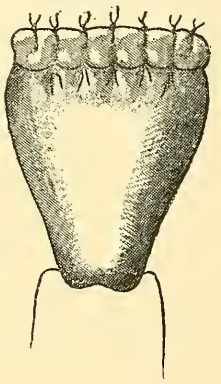

FIG. 158.—LIGATURE OF THE PEDICLE BY ZWEIFEL'S METHOD. Showing the coaptation by the partial ligatures and the superficial peritoneal sutures.

of the abdomen as in the successful case of Kleeberg, of Odessa, whom I have cited as the inventor of the elastic ligature, and who in 1887 allowed a thick and short stump to drop back into the peritoneal cavity, bringing out the ends of the constricting ligature through the lower angle of the abdominal wound. Péan has at times left a bundle of forceps projecting from the abdomen, with success. But these were all procedures of necessity. Fixation of the pedicle immediately below or in the thickness of the abdominal walls, with permanent communication exteriorly at this level, has been lately proposed and carried out as a procedure of choice, with the intention of permitting examination where the hæmostasis has been difficult, and to insure the

external discharge of products which could infect the peritoneum. The first to apply a mixed method was probably Freund [40] who, after amputation of a voluminous uterine tumor, made one bundle of stump and broad ligaments, passed an elastic cord about them and covered their extremities with a condom whose lower shut extremity he cut off; into this he passed a glass tube to the pedicle, brought the extremities of the elastic ligature out of it, and packed with iodoform gauze. The patient recovered. It is very evident that the rapid formation of protecting adhesions, and not the condom, made the barrier against

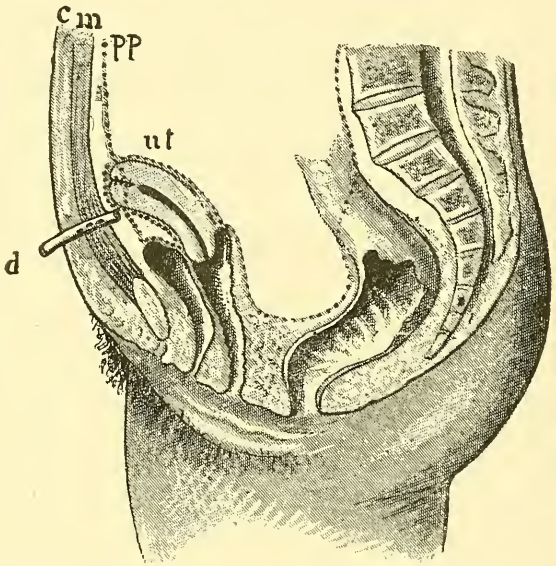

FIG. 159.—WOELFLER-HACKER'S MIXED TREATMENT OF THE PEDICLE. *c*, Skin; *m*, muscular layers; *pp*, parietal peritoneum; *d*, drain; *ut*, pedicle. Median section; diagrammatic.

infection of the peritoneum; tamponing with iodoform gauze above the pedicle would have been both more simple and more sure.

Two surgeons of Vienna, pupils of Billroth, Wölfler and Von Hacker,[41] and Sänger, of Leipsic,[42] have lately proposed a mixed method which deserves to be described in detail. Hacker conceived the method, inspired by a case of Billroth's,[43] and first performed it, August 31st, 1884.

Wölfler-Hacker's Method.—The pedicle is sutured according to Schröder's method and is then dropped back, so that its summit lies against the deeper surface of the abdominal wall; it is fixed there, close to the peritoneal incision, by passing through it on each side a carbolized silk suture which traverses its superficial layers and

then the abdominal walls. The ends of the silk are looped over small rolls of iodoform gauze and tied so that the surface of the stump is held between the lips of the peritoneal wound. The edges of the parietal peritoneum are not sutured together at this point, but are carefully stitched around the top of the pedicle so that it, as regards the abdominal cavity, is extra-peritoneal, and yet juxta-parietal. The abdominal walls are then sutured, leaving only room for a band of iodoform gauze and the drain which is passed down to the pedicle (Figs. 159, 160).

The first two cases of Wölfler and Hacker recovered with but little suppuration or sloughing; both would probably have died of septic peritonitis if the pedicle had been abandoned within the ab-

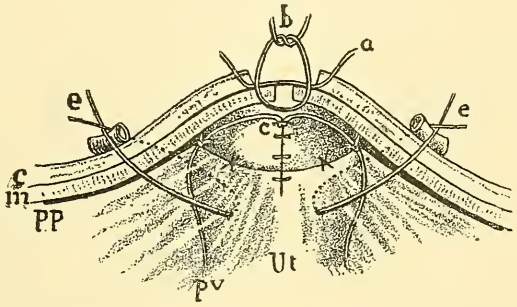

FIG. 160.—WOELFLER-HACKER'S MIXED TREATMENT OF THE PEDICLE. *c*, Skin; *m*, muscles; *pp*, parietal peritoneum; *pv*, visceral peritoneum; *ut*, pedicle; *a*, cutaneous suture; *b*, muscular suture; *c*, peritoneal suture with catgut; *e*, pedicle supports on rolls of iodoform gauze. Transverse section; diagrammatic.

dominal cavity; then followed a number of cures by first intention. Fritsch adopted the method, and obtained nineteen successive successes, while Olshausen's and Schröder's method had given twelve deaths in thirty-nine cases. Although I have not adopted it exclusively, it is certain that the method is a very useful one, for it is applicable both to large and to short pedicles, which could not be drawn out of the abdominal wound without too much effort and where the abundance of the vessels and the number of the ligatures would render abandonment in the abdomen dangerous, because of the probability of secondary hemorrhage, mortification, and septicæmia.

Sänger's Method.—Intra-peritoneal sequestration (Abkapselung). —Sänger thus designates an operative procedure which consists of suturing the peritoneum closely about the pedicle, drawing upon the parietal peritoneum for this purpose, and fixing it along the posterior

face of the stump. The abdominal cavity is thus separated from its lower division, in which lies the sequestrated pedicle.

Sänger distinguishes two modifications of this procedure:

1. The pedicle is sutured by Schröder's method but, hemorrhage being probable, it is sequestrated by suturing to it the parietal peritoneum, with drainage (Fig. 161).

2. The pedicle is too short to be drawn out of the abdomen. The transfixing pins are placed some distance above the elastic ligature, which is disposed as in Hegar's method. The peritoneum is then sutured to the upper part of the pedicle in front of the elastic liga-

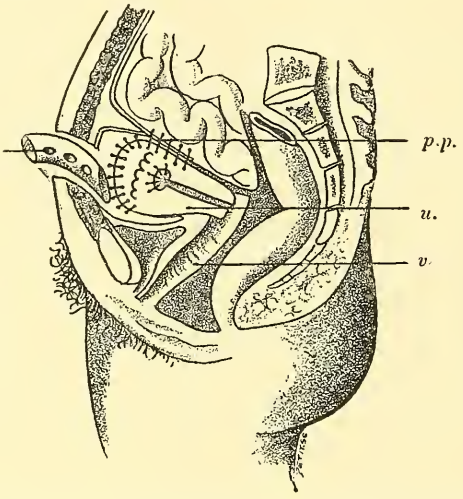

Fig. 161.—Sænger's Mixed Treatment of the Pedicle; Intra-peritoneal Sequestration of a Pedicle Sutured by Schroeder's Method. *pp*, Parietal peritoneum sutured to posterior surface of stump; *u*, uterine pedicle; *v*, vagina; *d*, drainage.

ture, to sequestrate it from the abdominal cavity. A barrier is thus formed above, making the elastic ligature extra-peritoneal and yet intra-abdominal (Fig. 162). Sänger has thus obtained great success with a stump which was very short, thick, and hemorrhagic.

A careful study of these two methods demonstrates that the first of Sänger's does not differ materially from Wölfler-Hacker's, for the two lateral sutures for the suspension of the uterus are replaced by the suture of the peritoneum to the posterior face of the stump. As to the second, it is practically Hegar's method applied to a very short stump, where the suture around the pedicle is replaced by the suture above it of the peritoneum; but it presents this originality, that the peritoneum is sutured (with catgut) above the elastic ligature

to the part which is intended to slough. Sänger powders the stump with a mixture of salicylic acid, iodoform, and tannin; to this I add a covering of iodoform gauze.

Extirpation of the Pedicle—Total Hysterectomy.—In those rare cases where the cervix is so full of fibrous tumors that it is impossible to save a pedicle, we may be obliged to perform total hysterectomy. Practically, by placing an elastic ligature upon the capsule, it is almost

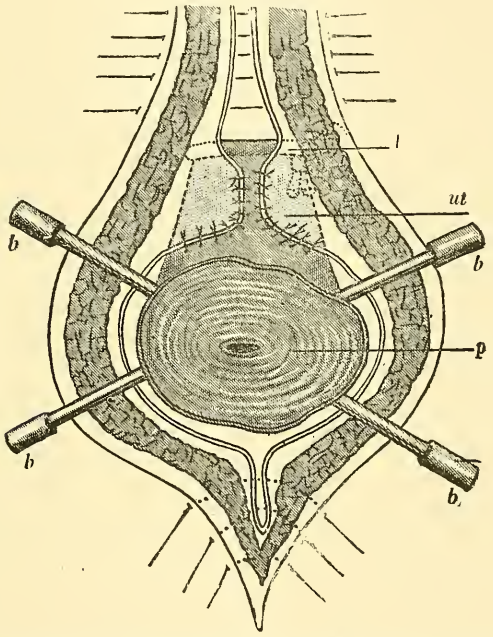

FIG. 162.—TREATMENT OF THE PEDICLE BY SAENGER'S MIXED METHOD. Intra-peritoneal sequestration of the pedicle, with elastic ligature. *l*, elastic ligature; *ut*, posterior surface of uterus; *p*, pedicle (section); *b*, pins.

always possible to save a pedicle in enucleating and excising the stump, and if this is too short to be maintained externally, the mixed method may be adopted or it may be abandoned in the peritoneum. The procedures of Olshausen and Sänger do not seem to me less serious than total extirpation, even though Bardenheuer has recorded six successful cases with them in seven operations; his cases appearing to have been simple ones which would have recovered with any other method. The cases published since then have not been very numerous, which proves the legitimate objection to the application to fibroma of Freund's operation for cancer, which is to-day condemned.[44]

Of late, however, there has been an attempt to revive total extirpation. Martin[45] has advocated it. He first does a supra-vaginal hysterectomy, after applying the provisional elastic ligature, then an assistant frees the cervix by the vagina and the surgeon completes the operation through the abdomen by tying the broad ligaments and separating the bladder. Martin advises that the intestines be protected by a sponge full of antiseptic oil, thinking that he thus prevents the formation of adhesions. T. J. Crofford[46] has published one successful case, but his technique (he employed the écraseur) seems very defective.

Bardenheuer has recommended as a procedure of choice, even in simple cases, to evert the broad ligaments toward the vagina, holding them in position by sutures, thus facilitating drainage.[47]

IV. *Intra-ligamentous and Pelvic Fibroma—Decortication.*—Fibromata from the supra-vaginal portion of the cervix and the lower part of the body of the uterus grow below the peritoneum, which they elevate and unfold and are seldom covered by it completely, having a tendency to insinuate themselves into the cellular spaces of the pelvic floor. They may thus split the meso-rectum up to the superior strait, or lift up the utero-vesical pouch and compress the bladder against the pubic bone, or, as in the great majority of cases, they may spread into the broad ligaments, whose folds they entirely efface. From the surgical point of view all these varieties belong in one natural group, characterized by extreme difficulty in forming a pedicle and intimate and extended connections with the walls and viscera of the lesser pelvic cavity.

The surgical treatment of these tumors is attended by the greatest difficulties. After opening the abdomen, if they appear too large for extirpation to offer real chance of recovery, we may perform castration (palliative) in place of extirpation (curative). We must, however, recognize that in these cases it is not the hemorrhage which is the most important symptom, but the compression, and that therefore castration has but an uncertain value; if performed, it is only as a makeshift.

I propose to reserve the term "decortication" for the extraction of the tumor from its cellular bed, and the term "enucleation" for its removal from the uterine tissue; the use of the latter word for the two operations, so different in their natures, has given rise to great confusion. It is impossible to give a typical description to cases which are beyond all rules and hence termed "atypical."

The application of the provisional elastic ligature is seldom possible, and then only on a part of the tumor. Redoubled care must be employed not to include the portion of the bladder which is generally elongated upon the anterior face of the uterus. If part of the tumor projects far into the peritoneal cavity, the ligature is placed as deeply as possible about this lobe, which may then be removed without fear. An attempt is made to enucleate the deeper parts by strong traction, the elastic cord following the diminution of the tumor and keeping up a steady and sufficient constriction upon the capsule as it is emptied. Very often it is necessary to begin the operation by ligation and section of the adnexa on the side where we are operating, at the same time placing a deep ligature on the corresponding trunk of the uterine artery.

It may occur that these manœuvres are impossible, and that we must proceed at once to the important step of the operation, namely, the free incision of the tumor's intra-ligamentous seat, whose lips are then seized by strong forceps, and the decortication accomplished with fingers and spatula. The operator keeps up strong traction with toothed forceps, carefully dissects out the neoplasm and applies clamps to bleeding points, without forgetting the position of the ureters; the tumor once removed, he sees the veins of the broad ligaments, which are at times enormous, and is surprised to require more ligatures than he had thought necessary.

When the connections of the tumor to the uterus are not extensive, it is sufficient to apply hæmostatic ligatures or sutures as necessary, and leave the organ in place; but if they are close and the bleeding is hard to stop, it is better to decide on supra-vaginal hysterectomy without further hesitation. It may occur that this happens almost without our knowledge, for at the end of a laborious decortication we may reach, in a tumor which fills the pelvis, a pedicle which is at once recognized as the cervix.

The resulting cavity may be very large, with prolongations toward the rectum, bladder, or on each side of the vagina; its treatment may be according to one of the following plans:

If we feel perfectly sure that the operation has been aseptic, we may try for primary union without drainage. If the peritoneum has not been torn or contused, as is the case with small tumors and where the adhesions are loose, a few points of suture are placed in the membrane to unite it, the peritoneal toilet is then completed and the abdomen closed. If the pocket is very deep and the bleeding is free,

we may make a continuous suture in terraces, which both unites the parts and stops the hemorrhage. Débris which may mortify should be excised.

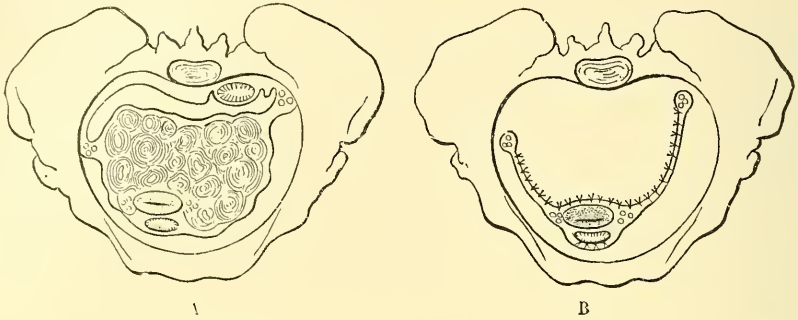

FIG. 163.—INTRA-LIGAMENTOUS FIBROMA. *A*, Horizoutal section to show the connections of the tumor; weight 14 lbs.; *B*, suture of the cavity resulting from enucleation of the preceding; drainage by the vagina; cure (Kaltenbach).

This bold procedure is justified only in exceptional cases; if the cavity is extensive and we fear oozing, drainage is more prudent.

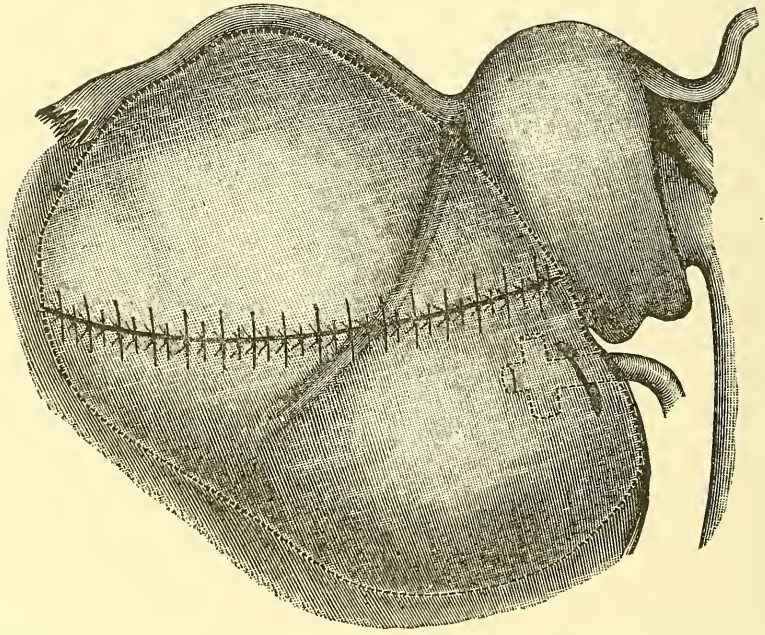

FIG. 164.—FIBROMA IN THE BROAD LIGAMENT; DECORTICATION AND SUTURE OF THE CAVITY, AND DRAINAGE BY THE VAGINA (MARTIN).

It may be performed in two ways; Martin[48] and Kaltenbach[49] recommend the use of a cross-tube through the vagina, passed through the cul-de-sac. Sänger, after dropping the pedicle left by the removal of

a tumor from just above the cervix, closed the abdominal walls and immediately opened by the vagina and packed with gauze the capsule filled with blood which projected into it; his patient recovered.[50]

Drainage through the inferior angle of the abdominal wound is preferable in some cases, according to the situation of the cavity; it has the advantage of exposing less to infection. Terrier[51] has recently treated in this way the cavity of a myoma of the broad ligament; recovery, with permanent fistula. H. A. Kelly[52] decorticated a pelvic fibroma which had compressed the bladder, left open and drained the cavity, and then used weak carbolic injections through the drain without fear of effusion into the peritoneum, which was closed off during the first days by adhesions. I prefer to employ iodoform gauze, as it is at once a hæmostatic and a capillary drain, and I have used it with success in one case of intra-ligamentous tumor which weighed fifteen pounds.[53] Küster[54] has also packed the cavity and united its edges to the lower part of the abdominal wound. The gauze should be withdrawn a little at a time and replaced by a drain at the end of a few days.

Tauffer[55] has had curious success by partially resecting large fibromata of the ligaments, fixing the stump in the abdominal wound, and then treating it by strong cauterization with chloride of zinc.

Operative Accidents.—Hemorrhage is one of the most serious dangers, and has caused many deaths upon the operating table, but it may be avoided by the judicious use of the temporary elastic ligature. It must be noted that we do not produce here, as in the application of the Esmarch bandage to a limb, an ischæmia of the tumor; this idea of L. Labbé's, though ingenious, is still pure hypothesis; and beside the almost insurmountable difficulties in application, it exposes to excessive manipulation, and without doubt to embolism. We must not be surprised, therefore, on cutting the tumor above the ligature, to see a large discharge of residual blood which has been imprisoned by it. If the case is one of telangiectatic tumor or if the broad ligaments are traversed by dilated veins (tubo-ovarian varicocele), the ligaments must be tied with the greatest care and cut only between two ligatures. The threads should be passed with a dull needle to avoid puncture of the vessels—an accident which has often caused large subserous hemorrhages, and to save time the ligatures may be replaced by long forceps.

In cutting the tumor above the ligature, the greatest care must be exercised to prevent the section from going too near the elastic band

and thus allowing the escape through it of any part of the tumor's pedicle from the constriction of its circumference. The extra-peritoneal treatment of the pedicle, with the use of the elastic ligature, permits us to avoid all secondary hemorrhage, but with the intra-peritoneal method (suturing the stump with catgut or silk), this is not the case even though the uterine arteries be strongly ligated to right and left of the pedicle by passing a stout needle through a certain thickness of the organ. In spite of this precaution, we often see fatal hemorrhage from shrinking of the tissues and relaxation of the ligature a few hours or days later.

The possibility of wounding the bladder should always be remembered. The cases are numerous where it has been lacerated, or partly included in the permanent ligature. If the viscus is elongated in front of the tumor it must be dissected off sufficiently to allow the ligature to be placed below it.

When the bladder is extensively wounded,[56] it should be closed immediately by a continuous catgut suture on two or three planes. Catgut is preferable when the stump has been treated by the extra-peritoneal method, for silk is porous and may cause infection by absorbing the secretions from the furrow around the pedicle. When the stump is abandoned within the peritoneum, as in myomectomy, silk may be used. A soft catheter furnished with a tube forming a siphon should be left in the bladder for ten days after the operation. Leopold has had complete success with this method, and I have employed it in a case of bladder wound 12 cm. in length, which was perfectly cured although the patient removed the catheter after six days and caused a partial temporary disunion of the vesical suture, which was rendered aseptic by iodoform gauze placed in front of it. In a former case which occurred in the course of an ovariotomy, where the wound was enormous (20 cm.), I sutured its intra-peritoneal portion and maintained a small hole unsutured as a safety valve; the patient recovered after a period of temporary fistula, which was easily effaced by freshening its edge.

Sänger adopted a different procedure in a case where the elongated bladder was taken for the pedicle of an ovarian tumor and included in the sutures, retaining these and closing the peritoneum around and above the vesical stump by sequestration similar to that employed for the uterine pedicle: cure without fistula. A permeable urachus, divided during the operation, has rarely caused fistula; these have, however, a tendency to heal spontaneously (Atlee, Sänger). It

is well to carry the incision of the abdomen outside of this cord when it is encountered, and if slightly wounded, it should be sewn into the abdominal wall by one or two deep sutures (Spencer Wells). If the wound in it is very extensive, it may be closed by a few sutures and the patient catheterized every three hours to prevent distention of the bladder.

I am inclined to think that the ureter has often been ligated during hæmostasis of the stump which is returned to the abdomen, and in decortication of intra-ligamentous fibromata, and that many of the deaths attributed to shock are really due to this accident. The relations of these ducts should never be forgotten in placing deep ligatures on the sides of the uterine neck.

The intestines may be simply applied to the surface of a fibroma which splits the mesocolon, and it is then easy to separate them by the finger, or there may be firm union between them when the tumor derives its nutrient vessels from such adhesions, as I have observed in the case of a large subperitoneal fibroma with a narrow and small vascular pedicle. A thin layer of the tumor is then to be left adherent to the intestine, which if not too extensive may be folded upon itself and sutured (Fig. 150). If, however, a large surface of the intestine has thus been wounded, we take the risk of contracting the digestive tube by coaptation of the bleeding part; it is then better to touch it lightly with the thermo-cautery and fix it to the parietal peritoneum by a few catgut sutures, as near as possible to the abdominal drain. To simply abandon it within the abdomen would be to produce conditions that would favor an attack of ileus.

Causes of Death after Abdominal Hysterectomy.—Hemorrhage, septicæmia, and the complex syndroma called shock are the chief causes of death after operation; less often it is due to embolism, ileus, or tetanus.

I have already spoken of primary hemorrhage at the time of operation. In Schröder's method secondary bleeding is always to be feared and is announced by the extreme agitation of the patient, the accelerated, irregular, small pulse, and pallor of the integument and mucous surfaces. In other cases we may find a serous fluid oozing out between the sutures, or the patient describes a pleasant sensation as of a jet of hot water flowing through the abdomen. The blood may escape in great amount below the peritoneum between the broad ligaments, forming enormous retro-peritoneal hæmatoceles, or it may accumulate in the seat of the enucleated tumor, project-

ing through the ecchymosed vagina and pressing it strongly downward.

If there is reason to suspect an internal hemorrhage, there should be no delay in opening the abdomen, both to tie the bleeding vessels and to remove the clots which form an excellent culture medium for the microbes which enter from without, by the tubes, or from within, through the wall of the paralyzed intestine. O. Küstner[57] reports a remarkable case which he saved in this manner, where the bleeding came from the pedicle in the abdomen after ovariotomy. If the state of the circulation permits and the heart's action is not too much compromised, a litre of sterilized water at 38° C. (100° F.), containing chloride of sodium (6 : 1,000) may be injected by the cephalic vein. For this purpose we may use a small canula, passed through an alcohol flame, and a funnel of glass furnished with a rubber tube a yard in length, sterilized with boiling water. If the pulse is weak, and it seems dangerous to suddenly increase the contents of the vessels, injections of water and chloride of sodium, 100 to 200 gm. at a time, may be given into the subcutaneous cellular tissue;[58] the fluid is very quickly absorbed.

Septicæmia may occur in several ways—either from defective asepsis during the operation, or, more frequently, from germs introduced from without through the pedicle; hence the precautions recommended for destruction of the mucous membrane, careful junction of the surfaces to obtain complete occlusion, and the other methods of treating the pedicle.

The constriction of the sutures does not account for the sloughing of the pedicle after it has been returned to the abdomen; to produce mortification, the action of germs is indispensable. If kept aseptic, the tissues deprived of their circulation undergo a granulo-fatty degeneration. The circulation may be re-established by the formation of adhesions or bridges of tissue above the pedicle, which is thus little by little encapsuled. There are records of a slow or secondary infection of the dropped stump by means of the sutures when they are of silk, or by the elastic cord. The germs may then come through the tubes or the intestine, following a temporary stasis of its contents; and in certain cases we must suppose a latent microbism. Whatever the origin may be, cases of death from pelvic inflammation and suppuration are not very uncommon.

Abroad, and also in France, death has been ascribed, after grave and protracted operations, to a combination of depression symptoms

called "shock." There is no doubt that a number of such cases are to be attributed to hemorrhage, of which some surgeons are too unwilling to allow the importance; others may be due to acute uræmia from accidental ligation of the ureters or abolition of the function of kidneys already seriously impaired by the influence of traumatism and absorption of the anæsthetic. Degeneration of the heart (Hofmeier[59]) may also be the cause in many cases (p. 234), such myocarditis being more frequent than is supposed. Cohnheim[60] has shown that persistent hemorrhage alone is enough to produce a fatty change in the cardiac muscle. Ungar and Strassmann[61] have called attention to the action of the chloroform in these cases; and many authors[62] have proved that the antiseptics act strongly on the heart. Some of these depression phenomena are due to the exposure of the viscera and the handling which they receive, as is evident from the experiments of Goltz on abdominal shock and of Olshausen on evisceration.[63] To these numerous causes of depression Landau[64] has added chronic intoxication from ergot, producing enfeeblement of the heart,[65] and a similar condition from iodine.[66] These substances have at times been taken in very large quantity by hypodermic and intrauterine injection, and their absorption may account for some of these symptoms.

To prevent shock, it is advised to adopt with weak patients the mixed method of anæsthesia, with a preliminary injection of morphine and atropine. I would also advise rapidity of operation, for the depressing effect in every laparatomy which lasts more than an hour is increased in high proportion. Contact of the intestines with the air must also be carefully avoided by protecting them with hot gauze compresses and closing the abdominal wound as soon as the tumor is drawn out of it. The incision should be as small as possible, passing the tumor as through an elastic button-hole, and aiding its issue from the abdomen by movements of rotation upon its axis and by elevation through the vagina by the fingers of an assistant. For the depression and lowered temperature, we employ hot friction, and hypodermic injection of ether, alternating every quarter of an hour with caffeine. If acute anæmia has helped to cause the accident, 100 to 200 gm. of the salt solution may be injected into the sub-clavicular dorsal region.

As embolism[67] has produced death even during convalescence, we cannot insist too much on absolute rest, especially if the tumor was very vascular or the broad ligaments largely varicose.

Intestinal occlusion has been observed after hysterectomy, as after all other abdominal operations,[68] but it must not be forgotten that some of the cases published under this head were only pseudo-strangulation from paralysis of the intestine, announcing a septic peritonitis which was unrecognized.

To prevent this terrible complication, we should be sparing of antiseptics within the abdominal cavity, if we do not abstain from them altogether; for they exert an extremely intense action upon the delicate epithelium, and predispose to plastic exudation. As little bleeding surface should be left in the peritoneal cavity as possible. The wound surface of the stump should be carefully covered with peritoneum; and the broad ligaments, if torn or divided in the process of decortication, must be secured with catgut sutures.

As regards the treatment of ileus, before reopening the abdomen we should try the method proposed by Bode and Leopold,[69] of placing the patient upon her side and giving forced enemata of hot chamomile infusion, with the addition of oil and soap.

Mortality of Hysterectomy. Comparison of Results by Different Methods.—It is difficult to decide as to the gravity of the operation, as the majority of authors do not divide their cases according to systems which permit comparison. Thus supra-vaginal amputation should not be compared with decortication of a large fibroma; there is more difference between them than between amputation of the leg and the same operation on the thigh. But in default of anything better we must have recourse to statistics. The following are the most recent—evidently cases under the old methods, where the technique was imperfect and the antisepsis insufficient, are not of great value for the purpose.[70] The first series is borrowed from Paul Wehmer.[71]

A. Intra-peritoneal Method.

	Number of Operations.	Deaths.	Mortality.
Gusserow [72]	19	6	31.6 per cent.
Kaltenbach [73]	5	3	60 "
Martin [74]	86	15	17.4 "
Olshausen [75]	29	9	31 "
Spencer Wells [76]	26	10	38 "
Schröder [77]	135	41	30 "
Tauffer [78]	12	4	33 "
	312	88	8.2 per cent.

B. Extra-peritoneal Method.

	Number of Operations.	Deaths.	Mortality.
Bantock [79]	22	2	9 per cent.
Hegar [80]	22	6	27 "
Kaltenbach [81]	22	1	4.5 "
Keith [82]	38	2	5.3 "
Péan [83]	52	18	34 "
Tauffer	17	2	11.7 "
Spencer Wells [84]	20	10	50 "
Lawson Tait [85]	54	20	37 "
Thornton [86]	15	2	13 "
	262	65	24 per cent.

Zweifel has collected a more recent series by German surgeons ("Die Stielbehandlung," etc.)—

A. Extra-peritoneal Method.

	Number of Operations.	Deaths.
Carl Braun von Fernwald, [87] from 1880 to 1887	63	12
Fehling [88]	15	1
Gusserow [89]	3	3
Kehrer [90]	9	2
Leopold [90]	14	3
Säxinger [90]	10	3
Schauta [91]	5	2
Schultze [90]	1	1
Werth [90]	2	1
Zweifel	8	1
	130	29

B. Intra-peritoneal Method.

	Number of Operations.	Deaths.
Carl Braun von Fernwald [92]	5	2
Dohrn [93]	9	0
Fehling [94]	3	2
Gusserow [95]	23	6
Kehrer [93]	3	2
Leopold [96]	19	7
Runge [97]	11	4
Säxinger [93]	7	6
Schauta [93]	1	1
Schultze [93]	12	3
Werth [93]	11	3
Winckel [93]	2	1
Zweifel	10	1
	116	38

In this series the mortality by the extra-peritoneal method is 22.3%, and, taking out the exceptional results of Braun, it remains 25.5%. By the intra-peritoneal method it is 32.7%; the relative benignity of the first being thus clearly displayed.

The following objection has been made to these figures: Avowed partisans of the extra-peritoneal method, like Kaltenbach, Thornton, and S. Keith, are found also among those who perform the intra-peritoneal; and it is evident that the two methods cannot be equally favored in both the series, and, very probably, where the pedicle was abandoned within the abdomen, the case was more serious than those where the favored method was employed. In order to have a series of statistics free from this objection, it is well to take the figures of surgeons who practise the intra-peritoneal method exclusively. Here is such a list, extracted from the preceding:

	Number of Operations.	Deaths.	Mortality.	
A. Martin	86	15	17.4	per cent.
Olshausen	29	9	31	"
Schröder	136	41	30.1	"
Gusserow	23	6	26	"
Schultze	12	3	25	"
Werth	11	3	27.2	"
Dohrn	9	0	0	"
Leopold	19	7	36.8	"
Runge	11	4	36.3	"
Zweifel—after exclusive adoption of his partial juxtaposed ligature—first series of operations	10	1	10	"
	345	89	25.8	per cent.

The mortality falls by this list to 25.8%. But if a similar series as regards the extra-peritoneal method is made, leaving out the cases of Schultze and Werth, well-known partisans of the other method, the mortality here falls to 21.6%; the superiority is then actual, as is verified by the latest statistics.

Tauffer [98] in 51 hysterectomies had 12 deaths—22% (extra-peritoneal); Fritsch [99] in the operations where he employed the extra-peritoneal method, a little modified to resemble Wölfler-Hacker's, had 23 cases, 5 deaths, and, by Schröder's method, 27 cases and 11 deaths; Albert [100] in 30 cases had but 1 death by the extra-peritoneal method.

C. Braun [101] in his last series of 38 hysterectomies with the extra-peritoneal treatment had but 6 deaths, or 15.5%; and Hegar [102] in his last series from June, 1887, to May, 1889, comprises, besides 2 myo-

mectomies for pedicled fibroma with cure, also 18 supra-vaginal hysterectomies for interstitial tumors with cure, and 12 hysterectomies for intra-ligamentous tumors with 2 deaths, one at the end of four months and the other at the end of five.

We must not forget that each one of these methods has its own dangers. The presence at the bottom of the abdominal wound of a stump destined to slough is at the outset a decided disadvantage for the extra-peritoneal method, although the new dressing of powder adopted by Kaltenbach lessens the inconvenience which might result from the mortification of the pedicle. It should also be noted of this method that the cure is slow and leaves a weak point in the abdominal wall.

But these disadvantages are more than equalled by the greater security. The certain hæmostasis by the constriction of the elastic ligature, and the free escape of secretions from the pedicle, remove the twofold danger of internal hemorrhage and peritoneal infection which always exists when the stump is abandoned in the abdomen, especially when the uterine cavity has been opened.

Neither of these methods should be absolutely proscribed, but one or the other should be selected according to the case.[103]

The dangers of the intra-peritoneal method, which is evidently ideal in theory, are: Extreme vascularity, which renders control of the bleeding impossible without the application of so many sutures that they might cause mortification and septicæmia; opening of the uterine cavity, which would give access to germs from the vagina; in other words, there is danger with bleeding and with hollow pedicles: they are to be treated by the simple or the mixed extra-peritoneal method, which is designed specially to guard against such dangers.

For other cases the intra-peritoneal method may be chosen. In case of suppurating or gangrenous inflammation of the tumor, the extra-peritoneal method is the only one to be employed.[104]

The following table is my guide in the selection of a method of abdominal hysterectomy:

Pedicle solid; not vascular.	Ligatured or sutured with silk or catgut and abandoned in the peritoneum—Schröder's method.
Pedicle hollow; not vascular.	A. Sufficient length; extra-peritoneal treatment—Hegar's method. B. Insufficient length; mixed method—Wölfler-Hacker or Sänger.

Pedicle very vascular.	A. Sufficient length; extra-peritoneal treatment—Hegar. B. Insufficient length; mixed treatment with elastic ligature—Sänger. C. Very short; intra-peritoneal treatment with hidden elastic ligature—Olshausen; or total hysterectomy—Bardenheuer.
No pedicle; tumor interstitial or submucous; easily enucleated.	A. Lateral portions of the uterus; very vascular; supra-vaginal hysterectomy and extra-peritoneal treatment—Hegar. B. Anterior or posterior surface of the uterus; not vascular; enucleation, suture abandoned in peritoneum—Martin. C. The same, with opening of uterine cavity; supra-vaginal hysterectomy, extra-peritoneal treatment—Hegar.
No pedicle; tumor in the pelvic cellular tissue or included in the broad ligament.	A. Small tumor, easily enucleated; decortication, entire suture of the pocket, no drainage. B. Large tumor, easily detached from uterus, cavity large or bleeding; decortication, partial resection, superficial suture of the pocket, drainage by the vagina (Martin) or by the abdominal wound; iodoform gauze packing; uterus preserved. C. The same, with close vascular connections to part of lateral uterine wall; supra-vaginal hysterectomy (for treatment of pedicle see above); suture and drainage of the pocket, with or without packing.

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2. Gilman Kimball: Boston Med. and Surg. Jour., 1855.

3. Kœberlé: Documents pour Servir l'Histoire de l'Extirp., etc. Gaz. méd. de Strasbourg, No. 2 et seq. The first hysterectomy which he did was on December 19th, 1863.

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5. Péan and Urdy: Hystérotomie, de l'Ablation Partiel., etc., Paris, 1873. See also Péan: Leçons de Clin. Chir., 1876, vol. i., pp. 674 to 704, and 1879, vol. ii., pp. 808 to 830.

6. Hegar and Kaltenbach: Loc. cit., French trans., p. 345. Hegar is wrong in not giving to Kœberlé some of the credit which he gave to Péan. Zweifel does not commit the same injustice; loc. cit., pp. 8 to 10.

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jects the following, which fell to my lot: De la Valeur de l'Hystérotomie dans le Traitement des Corps Fibr. de l'Utérus. "Abdominal hysterotomy is an operation which, although very grave, is perfectly justifiable in certain cases, and deserves to take a front rank in surgery." This statement, which I place at the head of my conclusions, seemed at the same time very audacious (1875).

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CHAPTER XII.

CASTRATION FOR FIBROMA.

Clinical experience has long demonstrated that the cessation of the sexual life in women is followed by a remarkable diminution in the symptoms caused by fibrous tumors; the bleeding stops and the tumor atrophies. To hasten the appearance of this favorable period we may produce an artificial menopause by removal of the ovaries.

The term castration has given rise to much discussion; it should be reserved for ablation of healthy ovaries to secure a functional modification.[1] Hegar applies the term to any removal of ovaries, normal or diseased, which do not "form a notable tumor." [2] This definition is insufficient, for then the operation would be called castration when performed for a cyst of the size of the fist, and ovariotomy when it was of the size of the head. Battey and the Americans call castration "normal ovariotomy" and "oöphorectomy." It is not well to thus confound operations where the adnexa are removed, as the centres of morbid reflexes, hemorrhagic or painful, with those where it is done for a pathological condition diagnosed before the abdomen is opened, as in salpingo-oöphorectomy, generalized by Lawson Tait. The term castration is then to be used for the ablation of adnexa reputed normal, and it may be hæmostatic (Trenholme, Hegar) or analgesic (Battey). Oöphorectomy designates, like salpingo-oöphorectomy, extirpation of inflamed adnexa in salpingitis or ovaritis. Thus confusion is avoided.

Castration for painful dysmenorrhœa was done in 1872 at almost the same time by Hegar and Battey,[3] and surgeons had begun to familiarize themselves with the operation when Trenholme[4] published, in 1876, the first known case of castration for uterine myoma; a month after, Hegar performed it with the same object. There is no doubt that Hegar did not know of the operations of Battey and Trenholme when he conceived and executed his, although they had already been published,[5] and it is largely due to his writings and to those of his pupil[6] Wiedow that the operation has become general. In England,

Lawson Tait,[7] and, in France, Duplay,[8] Tissier,[9] and Segond[10] have promoted it.

It is not easy to formulate exactly the indications for this operation. Hegar[11] recommends it in nearly every case in preference to hysterectomy, the graver operation, holding himself ready to perform the second if the first is not sufficient; he mentions the different forms of fibrous tumor for which he has successively practised it, and finds that there are no exceptions. Thornton[12] has also had good results in cases of fibro-cyst. There is no doubt, however, that there are cases where the operation, though easy of performance, is dangerous from its consequences, and there are others where the danger arises from the inherent difficulties of its accomplishment.

In the first class belongs castration for large solid or fibro-cystic tumors;[13] for by the obliteration of the vessels, both blood and lymphatic, which it causes it may produce formidable and rapid changes in the fibrous mass. There may be œdema, as the result of the venous stasis or as the first stage of mortification, or embolism following thrombosis when the broad ligaments contain large vessels. The operation may also be dangerous from the risk of immediate hemorrhage when there are very vascular adhesions or when the alæ of the broad ligaments are effaced, as is the case with some intra-ligamentous tumors.

These considerations govern the operative indications, which may be thus stated: Castration should be employed in every case where its performance is less grave than hysterectomy, and where the latter is not especially indicated by compression phenomena.

With pedicled fibroma myomectomy is to be preferred for two reasons—first, because it is the less dangerous operation; and, second, because with this form of the tumor the bleeding is not the most important symptom, and it is against hemorrhage that castration is chiefly directed.

Interstitial fibroma with abdominal evolution and of small or medium size may be treated by castration if the only troublesome symptom is the loss of blood; and the same is true of pelvic and intra-ligamentous tumors at the beginning of their evolution.

Profound anæmia would be a strong indication for removal of the ovaries rather than of the uterus.

Castration is therefore contra-indicated with very large tumors, from the danger of œdema and mortification; with tumors of small size which give rise to compression symptoms; with fibro-cystic

tumors, from the relative benignancy of hysterectomy and the rapid course of the neoplasm; and, lastly, with telangiectatic tumors, from the danger of thrombosis. These are the elements which direct the choice of the operation, but it is difficult to formulate them in a definite manner before the abdomen is opened. As certain authors have truly said, castration always begins as an exploratory incision, after which the connections of the tumor may be exactly defined and the dangers of operation settled.

It is then either an operation of choice, decided upon before the first incision is made, or one of necessity, undertaken during the operation, when the opening of the abdomen has demonstrated that the risk of the premeditated hysterectomy would be too great or that extirpation of the ovaries is both possible and of evident advantage.

Terrillon has attempted to make the dimensions of the uterine cavity a precise and easily appreciated criterion for the performance of castration. According to him, when the cavity measures from 11 to 14 cm. this operation gives the best results; but when it is from 18 to 20 or 23 cm. there are few chances of success; he advises, therefore, that his flexible hysterometer (with a dial) be always employed before operating. In other words, this advice merely reiterates the danger of ablation of the ovaries in cases of large interstitial tumors, one of whose signs is great increase of the uterine cavity. It is better to make the diagnosis without the aid of the sound, for, as Winter has shown,[14] it may carry into the uterus the germs which exist normally in the cervix, and thus produce auto-infection of the patient. The use of a rigid instrument is dangerous from still another cause —it may produce a false passage on account of the distortion due to the tumor and the softness of the mucous membrane; suppuration of the myoma and death have thus followed such an exploration.[15]

Operative Technique.—The best time to perform the operation is during the week after the menses. The preparation for it and the rules for the abdominal incision are the same as in every laparatomy. Hegar advises always to palpate the ovaries and make sure of their exact position before making the incision, but, while a useful precaution, it is not always possible to acquire positive ideas upon this point before opening the abdomen.

There are three ways of reaching the ovaries—by the median line, the lateral aspect of the abdomen, and the posterior cul-de-sac of the vagina; the first is the only really practical method in the great majority of castrations for myoma.

The lateral incision presents theoretic advantages, because we come directly upon the ovary which is often thrust outward by the projecting tumor; Hegar has employed it, following the example of veterinary surgeons. But it seems to have been abandoned owing to the real disadvantages which it possesses—the necessity of a double wound, the strong retraction of the lips, the great vascularity of the tissues in this region, etc. It would be only in the case of a tumor of great size with much lateral displacement that this incision would be necessary, and it is in just those cases that castration is a dangerous operation, not to be deliberately proposed.

The vaginal incision finds its proper indication in the case of the operation which I have called the analgesic (Battey), performed in the absence of tumor and when we can determine the prolapse of the ovary into the pouch of Douglas; but it is altogether unsuitable when there is a fibroma which has lifted the pelvic tissues above the level of the superior strait. Moreover, there is danger by vaginal touch, of confounding a small lobulated fibroma with a prolapsed ovary, and, lastly, there is the danger of hemorrhage from dilated vessels of the broad ligaments—a danger which is here of especial importance owing to the depth at which we are obliged to operate.

Oöphorectomy by a Median Incision—First Step—Opening the Abdomen.—The incision is made at a greater or less distance from the umbilicus according to the height to which we suppose that the tumor has carried the adnexa, and should not extend more than about 8 cm., giving just room enough to pass one or two fingers. As soon as the peritoneum is reached, great caution is needed; a small incision is made in it with a bistoury held flat, and into this is passed a grooved director, and the incision is finished; thus we avoid wounding the intestine or the surface of the tumor, on which any scratch might cause copious bleeding.

Second Step—Finding and Removing the Ovary.—While the mesentery and intestine are held out of the way by a flat gauze-sponge, the index and middle fingers of the right hand are passed deeply through the wound and down upon the fundus of the uterus to search for the ovary; as soon as it is found, it is drawn with the end of the tube out of the wound between the two fingers; at the same time an assistant holds the lips of the incision together. To ensure a stronger hold upon the ovary, a pair of forceps may be used instead of the fingers, and special forms of the instrument have been devised for this purpose, but a long and somewhat curved pair is all that is

needed, passed beneath the ovary and the pavilion of the tube. A blunt needle with a double thread is then used to tie off these parts, and for this purpose I am accustomed to employ Lawson Tait's knot (p. 54, Figs. 34 to 37), which is quickly tied and leaves but one knot within the peritoneum; but if the pedicle is very large, it is better to tie it with two crossed ligatures. It is well to include the tube in this ligature, for it is frequently the seat of chronic inflammation, and its complete removal contributes much to the cure of both pain and hemorrhage.

If the pedicle is very short, it is advisable to add to this ligature in mass (which may slip) separate ligatures for the vessels, which are to be carefully sought upon the surface of the section. We should also assure ourselves that the ligature has been placed below the ovary, and that no portion of the organ has escaped. The crushed and flattened form of the ovary is very remarkable in certain cases of fibroma. As an additional measure of safety, I prefer, with Hegar, to cauterize the pedicle with the thermo-cautery, producing a thorough destruction of the tissues; if there remains any vestige of the ovary, it will thus be sufficiently modified to ensure its absorption. The operation is not successful if the least part of the organ is left to become, as P. Müller[16] has shown, the seat of new cystic formations.

This cauterization may be performed on the flat surface of a forceps furnished with an non-conducting plate of ivory; Hegar has given to this instrument a double curvature, which is very convenient when the pedicle is deeply situated (Fig. 165). Instead of cutting the part away with the cautery, which is very slow, I prefer to use it only when the section is completed with the scissors, leaving a small stump, which I gradually dry up with successive applications of the cautery carried to a dull red heat. This cauterization is at the same time antiseptic, hæmostatic, and destructive of the last portions of the ovary. When the ovary can be readily seized, I do no use the forceps, but grasp the organ with the left hand, cut off about three-quarters of the pedicle with the scissors, at the distance of 1 cm. from the ligature; then, holding the pedicle by the uncut portion, I cauterize the surface of the section with the thermo-cautery, and as the last thing complete the division of the pedicle with it.

The ends of the ligatures should not be cut until it is sure that there is no more oozing and that the threads are well placed; but if they are left to the end of the operation, with the idea of a final

supervision, they may do harm by the traction which is exerted upon them.

The second ovary is removed in the same manner.

If the small incision which I have recommended is not large enough, it would be better to enlarge it either above or below rather than to use much force; but it is dangerous to carry this increase too far, or to divide the insertion of the rectus muscle, as has been advised. If the intestines are much in the way the patient should be put in Trendelenburg's position, which causes them to fall toward the diaphragm (see pp. 87 and 89).

Tamponing the vagina or rectum to bring the ovaries out of the lower pelvis is a procedure which is rarely needed in the removal of

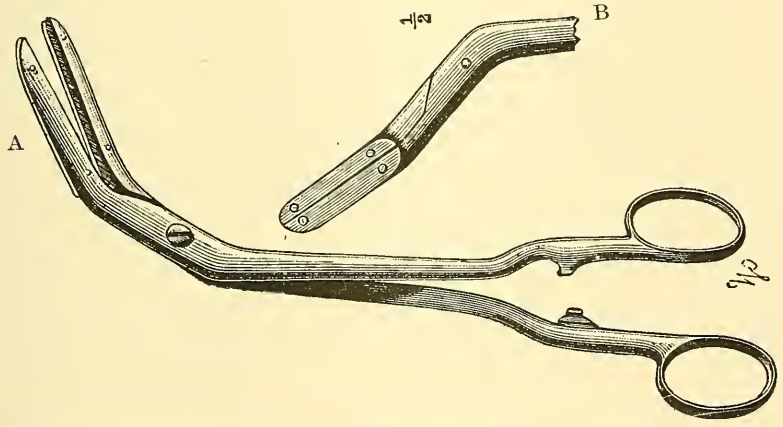

FIG. 165.—HEGAR'S FORCEPS FOR CAUTERISING THE PEDICLE IN CASTRATION. *A*, Upper surface; *B*, under surface with ivory plate.

abnormal organs, for they are then more often found above than below the superior strait.

Evisceration or the temporary extraction of a portion of the intestine is at times advantageous, but it is so dangerous that I think it should be kept as a last resort, for it is difficult to replace the intestines into the cavity of the abdomen which becomes sensibly diminished by the operation while they become distended with gas. And, finally, the paralysis which sometimes follows their exposure may, in spite of all precautions which can be taken, end in septicæmia from the absorption of intra-intestinal toxic substances.[17]

In any case we should not imprudently bring the tumor out of the abdomen; it becomes congested and swollen and very difficult of reintroduction, which exposes to the risk of thrombosis and embolism;

but there is no danger in turning it upon its axis in the abdomen to make the adnexa more accessible.

Adhesions between the ovary and tube and adjacent parts should, on account of the large development of the venous circulation which occasionally accompanies fibromata, be detached only with the greatest caution and as much as possible under the control of the sight.

When the broad ligament, especially the portion attached to the ovary, is very short, it forms an insurmountable obstacle to the success of the operation; the ligatures slip and it is impossible to form a pedicle. In one such case Hegar terminated the operation by hysterectomy in order not to lose the patient by hemorrhage. The

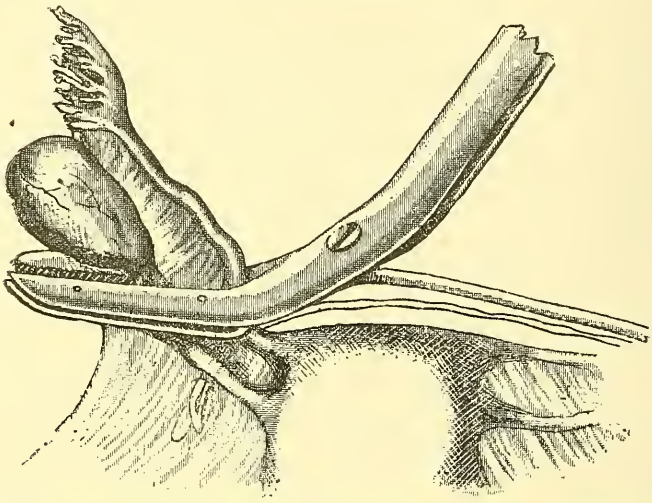

Fig. 166.—Castration. The tube and the ovary are seized with Hegar's forceps; the ligature is passed around the pedicle by a blunt needle.

bleeding may be arrested by a strong suture made like a hem in sewing, or, after the example of Hegar,[18] an elastic ligature may be applied to the ovarian pedicle.

Some surgeons attribute great importance to ligature of the tubo-ovarian vessels even without removal of the ovary, believing that it causes fatty degeneration of the ovary or directly modifies the vitality of the uterus and favors atrophy of the tumor.[19] Although such an "atrophy ligature" (Antal) may be employed as a necessity when removal offers great difficulties or dangers, it would certainly be a mistake to advocate it as a matter of choice. Terrier is its avowed partisan, and Segond[20] accepts it as an expedient to diminish the number of merely exploratory laparatomies; but this "expedient"

does not appeal to me, and, while its usefulness is questionable, it does not seem to me harmless.

It seems to me much better to remove both ovaries, close the abdomen as soon as possible, and not wait to perform ligation of a vessel which shall produce a theoretical atrophy by lessening the afflux of blood. It has been claimed, however, that by this method, unilateral castration has in certain cases an influence upon the development of a myoma which is on one side of the uterus. Removal of the ovaries is rational only when performed on both sides to produce an artificial menopause.

Unilateral castration appears to have had its rise from the necessities of operation rather than from theoretic conceptions; the latter have come afterward to make it legitimate. Sims, Battey, and their imitators are plainly following a mistaken path in praising it.

Third Step—Toilet of the Peritoneum and Suture.—This toilet is usually very rapidly made, except when there has been a rupture of a coexisting cyst in the tube or broad ligament. The threads passed through the abdominal walls at the beginning of the operation are removed, a continuous catgut suture of the peritoneum is made, and then of the muscular planes, ending with interrupted suture of the integuments by strong silk and a few supplementary sutures of fine catgut (Plate VI., Fig. 5). If the lips of the wound are contused, it is well to leave a drainage tube between the muscles and the skin, which may be withdrawn at the end of twenty-four hours. Drainage of the abdominal cavity is not employed unless there has been an effusion of pus (pyo-salpinx), or unless the operation has been very long and laborious; in the first case the peritoneum should be washed out with hot water.

After-treatment.—If there is a metrorrhagia a short time after the operation, hot vaginal douches and hypodermics of ergotine are to be employed. Strong compression of the abdominal wall must be kept up, on account of the presence of the tumor and the intestinal paresis which always follows a laparatomy. It is well also to keep the patient in a slanting position, by raising the pelvis, so as to cause the intestines to occupy the upper part of the abdomen. The second day a laxative enema should be administered to evacuate the gas.

Mortality and Results of the Operation.—Conforming to the method which I have adopted, I give the results obtained by surgeons of the greatest authority on this special subject. Hegar [21] in 55 cases had 6 deaths—11%—of which number 5 were from septicæmia (one case

due to infection before operation), and 16 cases, or 29%, presented complications of greater or less gravity, such as 3 mild cases of peritonitis, 7 of abscess, 4 of thrombosis of the lower extremity, 1 of pneumonia, and 1 of vesical catarrh: complete success in 33 cases. Deducting from these 55 cases the 6 deaths, and also 12 which were still too recent and 9 where there was a simultaneous extirpation of a large pedicled fibroma, there remain 24 cases of castration operated on more than a year and a half. The following are the results as regards cure:

(*a*) *Hemorrhage.*—In 20 cases there was immediate cessation of the bleeding; in 4 cases cessation after certain irregular losses; in 1 case persistence of irregular metrorrhagia; in 1 case temporary menopause, then hemorrhage and fibro-cystic development of the tumor; and in 1 case menopause, then hemorrhage with beginning enucleation of the tumor, which was finally extirpated by Fehling.

(*b*) *Tumor.*—In the same series of 28 cases there were 22 cases with diminution of the tumor; 3 cases with no change; 1 case, diminution doubtful; 1 case, appearance of a fibro-cystic tumor; 1 case, secondary enucleation.

Thus it is plain that the menopause and atrophy of the tumor are not necessarily correlative; the bleeding may cease without any diminution in the size of the fibroma, but this is the exception. Two of Hegar's cases became obese; another presented five years after the operation, which had been followed by the menopause and retraction of the tumor, a focus of parametritis coming from a blow upon the pedicle; and another was cured of a reflex chronic cough.[22]

The care with which these cases have been observed, the absolute security of the name of Hegar, give to these figures a peculiar interest; it is necessary, however, to know the collected statistics of different authors. The following are taken from Tissier's recent series:

In 171 operations, 25 deaths—14.6%. The causes of death were: In 12 cases septicæmia; in 1 case, embolism of pulmonary artery; in 1 case, cardiac debility, with death eleven days after the operation; in 9 the result was undetermined.

(*a*) *Results as to hemorrhage* in 146 cases: In 89, complete cessation; in 21, menopause after a period of irregular losses; in 10, return of the menses after a short respite. In this list are included one case of unilateral operation and one of ligature of one ovary; in three, the statement is simply that the patient was cured.

(*b*) *As regards the tumor* (146 cases): Nine times, no change; 66 times, rapid diminution; 71 times, no note on the point.

Wiedow[23] has published statistics, made with great care, where no patient is reported under a year after operation. There are 56 cases, which agree pretty well with those of Hegar just given. In 39 there was a menopause with atrophy of the tumor; in 5 the menopause alone is noted; in 5 there were small irregular losses; in 1 there were menopause for three months, then partial enucleation of the tumor, which was finished by the surgeon; in 1, amenorrhœa followed, then return of the menses with atrophy of the tumor; in 1 there were small losses lasting a day after amenorrhœal intervals of three months (no note as to the tumor); in 3 after menopause and atrophy for two years there was return of the hemorrhage and development of the tumor, which became fibro-cystic in 1 case.

Lawson Tait[24] has performed castration for fibroma 262 times, with a mortality which he puts at 1.23%; but we have no precise information as to the curative effects of his operations. Fehling has a series of 8 cases with no death;[25] in 5 the menopause was permanent; in 2, there were irregular hemorrhages at the end of one and two years; in all, the tumor diminished in size. Prochownik[26] in 12 cases had no deaths; the tumors atrophied, and the return of irregular hemorrhages was exceptional. Bouilly[27] has performed castration 8 times for fibroma, with excellent results; the tumor in every case diminishing. Segond[28] has had 4 successes, without a death; in 2 cases with immediate menopause and rapid atrophy. In 1 case the operation was unilateral, the menses became normal and painless, and the tumor remained stationary. In 1 case of eight months' standing there was hæmatemesis. Terrillon[29] in 5 castrations for fibroma had one death at the end of two months from continued intestinal compression. It is very evident that in this case the castration was performed as a makeshift, on account of the great dangers of hysterectomy. The fatal termination cannot be attributed to the operation, but merely shows how powerless is castration to cause rapid diminution of large tumors in any case. In 4 other cases violent hemorrhages were arrested.

These figures show both the relative benignancy of the operation and its value when judiciously employed. The number of surgeons who still prefer the operation of hysterectomy for all cases is becoming continually smaller.[30]

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20. Segond: Loc. cit., p. 431.

21. Hegar and Kaltenbach: Loc. cit., p. 405 et seq.

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23. Tissier, loc. cit., wrongly attributes this case of Freund's to Hegar.

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CHAPTER XIII.

FIBROUS TUMORS COMPLICATING PREGNANCY.

As is well known, pregnancy gives a lively impulse to the development of fibrous tumors, and often causes their œdematous softening. This phenomenon is the more marked as the connections of the tumor with the uterus are more intimate, and attains its maximum in the case of interstitial fibromata, single or multiple, with great increase in the uterine wall, as in those cases which have improperly been described as hypertrophy of the uterus. This sudden augmentation in the size of the tumor exaggerates any symptoms to which it may have given rise, the pain resulting from pressure on the sacral plexus becoming at times intolerable.[1] Retroflexion of a gravid uterus with a fibroma causes symptoms of internal strangulation.[2] When the tumor is pelvic, taking its origin from the supra-vaginal portion of the cervix, and developing below the superior strait, the compression signs are rapid and extreme;[3] they may appear in connection with the bladder, the ureters, the rectum, the nerves or the vessels, and peritonitis may coexist.[4] The most common and not the least grave result is abortion; and as involution is so much interfered with, immediate hemorrhage and septicæmia are both very likely to occur. Lefour[5] in 307 cases found 39 abortions, ending fatally to the mother 14 times; Naus in 241 cases observed 47 abortions.[6]

The treatment depends upon the nature of the symptoms caused and the seat of the tumor. If it is a pedicled or sessile subserous fibroma of the fundus we may hope that it will not interfere with the course of the pregnancy. If there is danger of inflammation or the transformation of the tumor into a fibro-cyst, there is also a hope that it will disappear during the uterine involution and we may therefore pursue the expectant treatment. In the case of pelvic fibroids, however, delay seems more dangerous; if they cause no very serious symptoms we may wait in the hope that they will either precede the fœtal head at the time of parturition, as has been observed, or else will ascend above the superior strait after the rupture of the membranes. All these results have been observed, and by the aid of

the forceps and of version labor has been successfully terminated, even in desperate conditions.[7] In such a case one should attempt to reduce the tumor by pressing it back with the hand in the vagina.[8] Often the labor is accomplished only after a duration which results in a fatal exhaustion, if the woman does not die at once of the hemorrhage. These risks decidedly limit the advisability of the expectant method. When the fibroma is accessible its extirpation presents less danger than waiting.

Fibrous tumors of the cervix are of this class, and may often be enucleated either before or after parturition. Danyau[9] removed one that weighed 650 grams and measured 15 cm. in diameter. Braxton Hicks[10] followed enucleation by the immediate use of the forceps and ended the labor without difficulty. J. F. Fry[11] reports the curious case of a woman who had been delivered of nine children and in whom a fibroma of the anterior lip complicated each pregnancy. At the eighth, a portion of the tumor was removed with the écraseur; on the ninth, premature labor was produced, and, immediately after the extraction of a living child, almost at term, the fibroma, whose base measured about 6 cm. in diameter, was enucleated.

Mundé[12] advocates enucleation by the vagina in any case where it can be accomplished; in 16 cases which he cites the mothers died in only two, and the children were for the most part living; one of these was his own personal case.

When the operation is performed late in pregnancy, there may be no interruption of its course; Mayo Robson[13] removed at the seventh month a fibroma of the cervix of the size of a cocoa-nut. The operation, performed with the galvano-cautery, was followed by such copious bleeding that many ligatures were required, but there were no complications and the patient went on to a normal delivery at term.

Polypi may be expelled before the fœtal head when their pedicle has been torn; of this Dubois and Dupaul have cited cases.[14] To facilitate the delivery the pedicle may be cut.[15] Fergusson's error, of placing the forceps on a large tumor, thinking that it was the fœtal head, should not be committed; his patient died from rupture of the uterus.[16] If the polyp is recognized before term, it may be extirpated without interrupting the pregnancy; Felsenreich[17] has recently published such a case where the tumor was as large as a lemon.

Interstitial fibromata with an abdominal development are so nearly inaccessible that any operation for their extraction would be too grave, and we ask ourselves whether it would not be better to

produce abortion. The feelings of the surgeon and his operative habits enter largely into the solution of the problem, though it must not be forgotten that even induced abortion is not free from dangers. If the placental insertion is at the seat of the tumor, the uterine tissue may not be able to contract after delivery, and thus formidable hemorrhage can occur. The patient is also exposed to the risk of puerperal septicæmia. Lefour, in a series of 23 induced abortions, observed 3 deaths. Tarnier,[18] in 7 cases where the labor was normal, has seen death of the mother once, of the child three times. In 6 cases terminated by the forceps, it was fatal to 4 mothers and 4 children. In 6 versions, 3 were fatal to the mother and 3 to the child. And 5 women who had fibromata died before parturition; once induced abortion was followed by success, and once embryotomy caused the death of the woman. Süsserott,[19] in 147 cases of pregnancy complicated with fibroma, which he collected, describes 20 where the forceps were applied with death of the woman 8 times and of the child 13; in 20 versions, death of the woman 12 times and of the child 17; artificial extraction of the placenta 21 times, death of the mother, 13 times: in all 78 women or 53%, and 66% of the children died.

It must be remembered that induced labor may cause the expulsion of a non-viable child, that it does not relieve the compression very much, and that, if we have to perform hysterectomy afterward, we have exposed the life of the patient twice instead of once: these are the reasons why most surgeons prefer early interference. Supra-vaginal amputation is evidently better than the Cæsarean operation, which Cazin[20] has performed with success in the seventh month. This author has collected 28 cases of Cæsarean section which were rendered necessary by the presence of a fibroma of the uterus; only 4 of the women were saved, 15 children were born alive, 8 were extracted dead; of the other 5 no information is given. Sänger[21] has recently collected 43 cases of this operation for fibroma, in which 7 women were saved, or 83.7%. Tuffier[22] has published one fatal case.

When it is decided to practise hysterotomy, if the fibroma is situated in the middle of the fundus or is pedicled, the partial operation of myomectomy, which does not interfere with the pregnancy, should be attempted. When it is sessile and there is need of cutting away the uterine tissue in the neighborhood of the tubes, myomectomy is attended by great danger of hemorrhage,[23] while the supra-vaginal operation (Porro's) is rendered easy by the relaxation of the ligaments caused by the pregnancy.[24]

Synopsis of Published Results.

I.—Simple Myomectomy; Uterus Not Removed.

Author.	Date of Operation or Publication.	Month of the Pregnancy.	Anatomical Condition.	Result.
Péan	Clin. Chir., Dec. 15, 1874, vol. i., p. 679.	Fifth	Fibro-cystic tumor...	Cure; abortion the day after operation
Thornton	Obst. Trans., June 4, 1879.	Seventh....	Tumor pedicled.. ...	Death, 7th day.
Hegar	Jan., 1880; Operat. Gynäk., 3d edit., p. 475.	Third	Tumor pedicled; soft; peritonitis.	Death, 3d day.
Schröder	Nov. 16, 1879, cited by Hegar, loc. cit.	Fourth	Tumor pedicled; multiple.	Cure; normal labor.
Studgaard	Dec. 19, 1882, cited by Hegar, loc. cit.	Three and a half.	Tumor pedicled.....	Cure; pregnancy not disturbed.
Martin	Ber. Klin. Wochen., 1885, No. 3.	Sixth	Myomectomy, with conoid excision of fundus alone.	Death, 7th day, of hemorrhage after abortion.
Landau	Ber. Klin. Wochen., 1885, No. 3.	.....	Myoma, on right side as large as infant's head; on left, as an egg.	Cure; normal labor.
Ogden	Can. Pract., April, 1885; cited by Van der Veer, Amer. Journ. Obst., 1889, vol. xxii., p. 1,138.	Not given..	Interstitial myoma, removed by enucleation; pregnancy not diagnosed.	Cure; abortion 12 days later.
Routier	Bull. Soc. Chirurg., Nov., 1889.	Third	Subserous myoma with large base.	Cure.
A. Bergh	Hygeia, 1889, Bd. li., No. 5, p. 292.	Fourth . ..	Two tumors, the larger size of two fists; enucleation.	Cure; normal labor.

The first six cases are from Hegar and Kaltenbach; I have added the others.

II.—Supra-Vaginal Amputation of Gravid Uterus.

Author.	Date of Operation or Publication.	Month of the Pregnancy.	Anatomical Condition.	Result.
Kaltenbach	Mar. 2, 1880; cited by Hegar, loc. cit., p. 475.	Fifth	Interstitial myoma at fundus; weight 3,500 gm.	Cure.
Wasseige	March 18, 1880.....	Fifth	Interstitial myoma of fundus; weight 4,500 gm.	Death, 6th day.
Nieberding	Feb. 10, 1882.....	Fourth	.....	Death in 49 hours.
Schröder	Jan. 10, 1883.....	Third.....	Interstitial myoma of size of adult head.	Cure.
Schröder	June 29, 1884.....	Third.....	.....	Cure.
Walter	Brit. Med. Assoc., Liverpool, 1883.	Fourth	Colossal tumor.....	Death, 9th day.
R. Barnes	St. George's Hosp. Rep., 1874–6, vol. viii., p. 91–5.	Third.....	Fibroma concealing pregnancy.	Death.

Author.	Date of Operation and Publication.	Month of the Pregnancy.	Anatomical Condition.	Result.
Alex. Patterson.	Glasgow Med. Jour., April, 1885.	Fourth	Fibroma concealing pregnancy.	Cure.
Etheridge.....	Am. Jour. Obst., 1887, vol. xx., p. 69.	Third (useless attempts to induce abortion had been made).	Fibro-cystic tumor...	Death, on 11th day, of peritonitis.
Karström.....	Hygeia, April, 1887; analysis in Cent. f. Gyn., 1887, No. 34.	Fifth	Intra-ligamentous; pedicle lost; drainage.	Cure
Freund	Unpublished case cited by Van der Veer, loc. cit.	Eighth.....	Fibroma concealing pregnancy.	Cure.
G. G. Bantock..	Brit. Gyn. Jour., vol. ii., p. 63.	Third.....	Fibroma concealing pregnancy.	Cure.
Hofmeier	Die Myomotomie, p. 76.	Third.....	Fibroma; pregnancy suspected.	Cure.
Dirner.....	Cent. f. Gyn., 1887, p. 119.	Second.....	Fibroma; fœtus dead and macerated.	Cure.
Kaltenbach.....	Cent. f. Gyn., 1887, p. 435.	Second.....	Fibroma disintegrating; fœtus macerated.	Cure.
D. Van Ott.....	Arch. f. Gyn., Bd. xxvii., p. 88, 1890.	Ninth; 263 days.	Large fibroma of supra-vaginal portion of cervix; intra-peritoneal treatment of pedicle.	Cure; living child.
A. Martin.....	Naturf. Versamml., Heidelberg, 1889; Cent.f. Gyn., 1890, p. 67.	Fourth ...	Tumor of lower part of uterus.	Cure.

Most of these cases relate to operations done before the ninth month; if Porro's operation is attempted, the prognosis is very grave, but, as an important consideration, there is the chance of saving both mother and child. This operation should be undertaken a few days before the expected time of parturition, never just at term, for fear of being surprised by labor. The operative procedure which seems to promise the greatest immunity from hemorrhage and septicæmia, which are much to be feared when the uterus is gravid, is the extra-peritoneal ligature of the pedicle (Hegar).

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17. Felsenreich: Wiener med. Woch., 1887, No. 52.

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CHAPTER XIV.

PATHOLOGY, SYMPTOMS, DIAGNOSIS, AND ETIOLOGY OF CANCER OF THE CERVIX UTERI.

The word cancer should have clinically a meaning synonymous with malignant neoplasm. A malignant character, displayed by uncontrollable invasion, reproduction, and generalization, is encountered in many species of tumor which are anatomically distinct, whose profound study interests the pathologist more than the surgeon, but yet furnishes certain indications which are useful in the matter of prognosis.

Pathological Anatomy.—The great predisposition of the cervix to the development of cancer has been noticed by all observers. Is there anything in general anatomy which will explain the fact? Cohnheim has supposed that the embryonal cells (embryoplastic cells of Ch. Robin) which have not been absorbed in the formation of the organs, and which are found scattered through the connective tissue or gathered in islands at certain points, may be the matrix tissue of carcinoma. These tumors are found most frequently in the nests of embryonal cells which define the natural orifices, where there is a more or less irregular involution of the blastodermic layers; the cervix uteri, developed relatively late, at the expense of the Müllerian ducts, belongs in this class of congenitally vulnerable points. The presence of two varieties of epithelium at the external os and the consequent plastic polymorphism which results may also be a factor in their production. There remains unexplained, however, the exciting cause of the neoplasm; the repeated afflux of blood upon which Cohnheim lays so much stress does not account for it.

In epithelioma of the mucous membrane it is evident that the heterologous formation proceeds from the epithelial cells, either of the rete Malpighii (Klebs), or from the cylindrical cells within the cervix which have passed the external os (Schröder), or from the glandular cells (Ruge and Veit). In cancer of the uterine parenchyma, the histogenic origin of the cells of the neoplasm is very obscure. Virchow derives them solely from the connective-tissue cells,

which accords with Cohnheim's hypothesis, and the latest researches of Ruge and Veit go to support the idea. According to these observers, cancer is usually a transformation of these connective-tissue cells, sometimes into a papillary or cauliflower form. The connective tissue becomes vascular and returns to the embryonic condition, and the cells take on an epithelial character; exceptionally an adenoma, also the product of these epithelial elements, may become cancerous.

Anatomical Forms.—From the clinical point of view, when these tumors are seen at the start, and before they have altered the primitive aspect of the parts by their spread to adjacent structures, we can distinguish four classes—(1) the papillary, (2) the nodular, (3) of the cervical cavity, and (4) the vaginal.

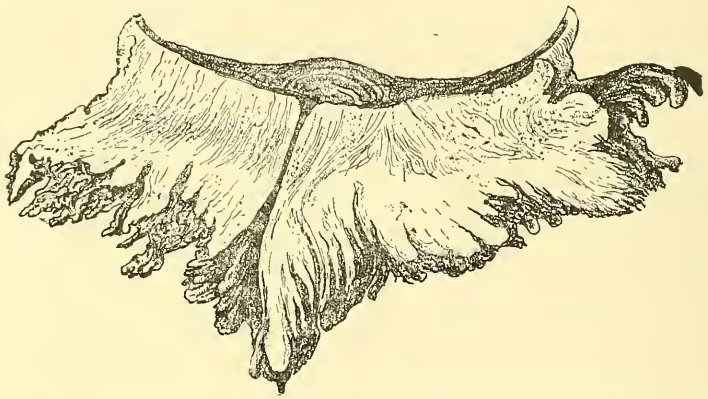

Fig. 167.—Papillary Cancer of the Cervix; Pavement Epithelioma of the External Os. Section, natural size.

1. *Papillary Form* (Syn.: Superficial cancer of the cervix, vegetating or cauliflower cancer).—This form begins on that part of the cervix which is below the vaginal insertion, and may remain for a long time limited to it. Often it starts from cylindrical epithelium which has invaded the external surface, as we have seen in the case of metritis; this, without ulceration, though at first benign, is transformed into an epithelioma. It may take on a fungous appearance, the os and the healthy lip being hidden beneath it, and for a long time show no tendency to spread; but there comes a time when it attacks the cul-de-sac, involves it both superficially and deeply, and passes on to the peri-uterine tissues; or the extension may take place along the cervical canal.

There is always an accompanying lesion of the mucous membrane of the body of the organ;[1] Abel in seven cases from Landau's clinic

found in three a sarcomatous degeneration, and in two others an interstitial endometritis which appeared to be developing toward sarcoma. He states that the malignant degeneration is produced concomitantly, though under a different histological form, in the two regions. These assertions of Abel are strongly disputed and far from being established.[2]

2. *Nodular Form* (Syn.: Parenchymatous cancer, cancerous nodosities, circumscribed or infiltrated cancer).—This form starts as one or several nodules in the mucous membrane of the cervix, on either the external or the internal surface, with ulcerations only late in the disease. By its progress it destroys the mucosa, and thus a cancerous ulceration results. Then nodules in the cervix and body fuse with

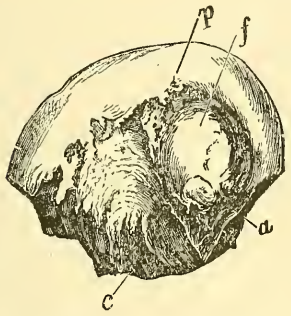

FIG. 168.—CANCER OF THE CERVIX, NODULAR FORM. *p*, Zone of intact pavement epithelium; *f*, cancerous nodule; *a*, external os; *c*, cervix.

FIG. 169.—BEGINNING CANCER OF THE CERVIX, ULCERATIVE FORM.

the first, and soon the whole organ and the adjacent tissues are involved.

3. *Cancer of the Cavity* (Syn.: Cancer of the cervical mucous membrane, boring or eating cancer).—This form develops at first in the cervical mucous membrane, or just below it, by an infiltration which soon ulcerates and causes a slow destruction of the part by erosion; there are cases of this kind where the cervix becomes a mere shell, and, with the retraction which is noticed as in the case of cancer of the breast, it may nearly disappear. The body of the uterus is early involved, then the peri-uterine connective tissue, and the vagina last or not at all.

4. *Vaginal Form.*—This is far more unusual than the others, begins in the posterior cul-de-sac as certain cancers of the tongue start from the floor of the mouth, and invades equally the cervix and the adjacent portions of the vagina, producing extensive ulcerations.

Histological Varieties.—The three kinds which are most often found are: (1) Pavement epithelioma; (2) cylindrical epithelioma; (3) carcinoma or atypical epithelioma. In France, since the writings of Ch. Robin, Cornil, and Malassez, the epithelial origin of cancer is the most favored doctrine, and carcinoma is considered as an alveolar epithelioma, a particular kind, an evolutionary stage of epithelioma, and not as a neoplasm developed from the first at the expense of the connective-tissue cells.[1]

Pavement epithelioma, lobulated or tubulated, is seldom general, though Virchow has observed it. The cylindrical form has the most frequent metastasis.

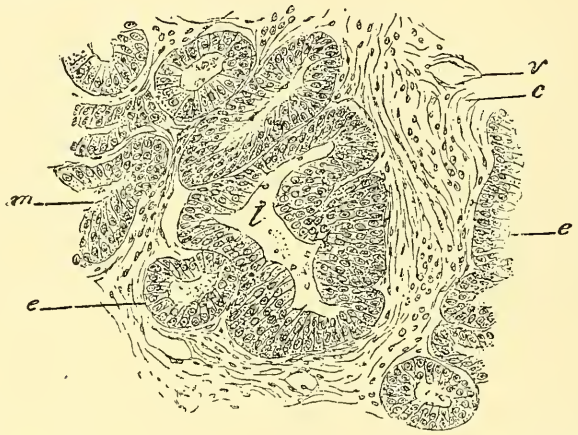

Fig. 170.—Cylindrical Epithelioma from the Upper Part of the Cervix, Invading the Fundus (x 150.) *m, e*, Hypertrophied glands of the body of the uterus, like those of chronic metritis; *t*, enlarged glandular cavity, the walls showing many layers of epithelium; *e*, adjacent gland wall, in a similar state; *v*, vessels; *c*, connective tissue (Cornil).

Pavement epithelioma is often found in the superficial forms, papillary and vaginal; the variety called lobulated is formed by cellular masses which separate the still evident muscular bundles, and which may undergo either a mucous or corneous change. Tubulated cancers are formed of cylinders stuffed full of epithelial cells which anastomose and penetrate between the muscular trabeculæ that still resist the invasion, and on section we see in the lumen of such tubes pavement cells becoming cubical and others deformed by pressure.

Cylindrical epithelioma is usually the form which begins in the cervix and spreads along its cavity, and resembles that of the uterine body (Figs. 170, 171, 172). It begins by a typical glandular proliferation (adenoma) and ends as an atypical (malignant adenoma), which

is simply an epithelioma. Cornil insists on the great histological resemblance between glandular endometritis and certain developmental stages of cylindrical epithelioma.

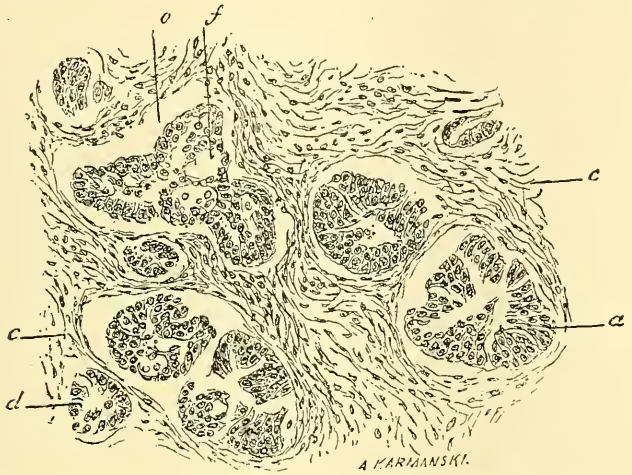

Fig. 171.—Cylindrical Epithelioma of the Body, Extended from the Cervix (× 150). *c*, *c*, Connective tissue; *a*, cavity full of cells, the external layer being cylindrical. These cells have a tendency to become detached from the wall, well seen at *o*; *f*, cavity with mucous cells, and large cells in mucous degeneration (Cornil).

The atypical epithelioma, or carcinoma of most German authors, is not clearly distinguished from certain forms of tubulated pave-

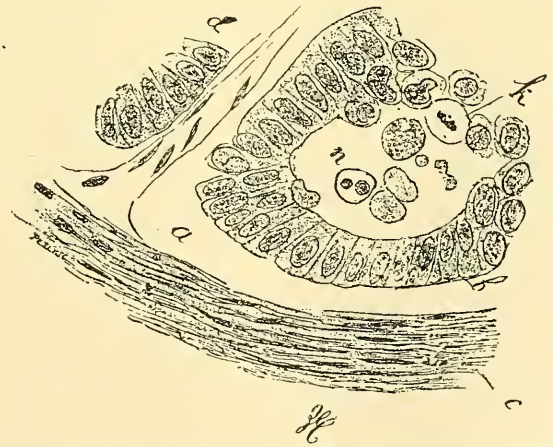

Fig. 172.—Cylindrical Epithelioma of the Body, Extended from the Cervix (× 400). *b*, Single layer of epithelium; *k*, cells showing karyokinesis; *n*, free degenerating cell; *d*, adjacent alveolus (Cornil).

ment epithelioma; it is characterized by polymorphism of its cells, which correspond to those of the alveolar wall or to those of the gland, and by their disposition in masses within the alveoli, whose

walls are formed by anastomosing bands of connective tissue (Fig. 173). When the fibrous stroma is small in amount and the cells are swollen and predominant, the tumor is called encephaloid (Fig. 176); when they are hard and dry, it is called scirrhus (Fig. 168).

FIG. 173.—CARCINOMA, OR ATYPICAL EPITHELIOMA. Section of one of the nodules of Fig. 168. On the median edge of the section the pavement epithelium ceases and is replaced by an erosion presenting a structure almost papillary and more or less ramified glands. The stroma is formed of fibrous bands which divide the aveoli of different sizes and these again are subdivided by smaller bands. The aveoli are filled with polymorphic cell elements; the exact origin of the cell-nests is difficult to determine; they are apparently from glandular cavities, of which some are covered with a single layer of cylindrical epithelium. These cavities are transformed to solid cords by the proliferation of the cells; the normal glands can be followed from the surface up to the middle of the cancerous nodule (Wyder).

Extension.—At an advanced period of the disease the characteristics peculiar to each form are lost in the destruction and grave symptoms caused by its extension, either to the vagina, the body, the connective tissue of the pelvis and the broad ligaments, the ureters and bladder, the rectum, or the peritoneum.

Extension to the vagina may be found at the outset, may occur rapidly in the papillary form, and may reach the vulva (Fig. 174).

Invasion of the body occurs late in the papillary form, but it should not be forgotten that the mucous membrane of the part may also undergo a degeneration of an intensely inflammatory nature by which it is made very liable to invasion (Abel). The body of the organ is very soon involved in the case of tumor of the cervical cavity, and in the nodular form may be infected from the first.

The pelvic connective tissue may be invaded from the cul-de-sac, the cervix, or the fundus; the uterus is then imprisoned, as if

glue had been poured about it and had hardened. The broad ligaments become thick and shortened, and toward the end the vessels and nerves of the lower pelvis, especially the branches of the sacral plexus, may be involved, when we observe œdema and intense pain.

The ureters are often involved, for instead of merely pushing them out of the way, as does a fibroma, the neoplasm assimilates them little by little; occasionally the wall of these ducts may be ulcerated through, and thus a fistula produced. Most frequently the ureter is constricted; its calibre being diminished at the lower end, the duct is dilated up to the pelvis of the kidney by the constant accumulation of urine under high pressure. The great frequence of renal disease in cancer of the uterus has been known for a long time, and recently made the subject of special study. Lancereaux[3] asserts that this ascending nephritis is constant when the disease is at all advanced, and during twenty-five years I have never seen it absent at autopsy, unless the patient had died prematurely from metrorrhagia.

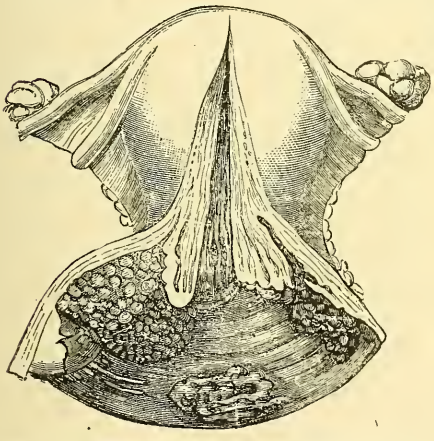

FIG. 174.—EPITHELIOMA OF THE CERVIX EXTENDING TO THE VAGINA; PAPILLARY FORM.

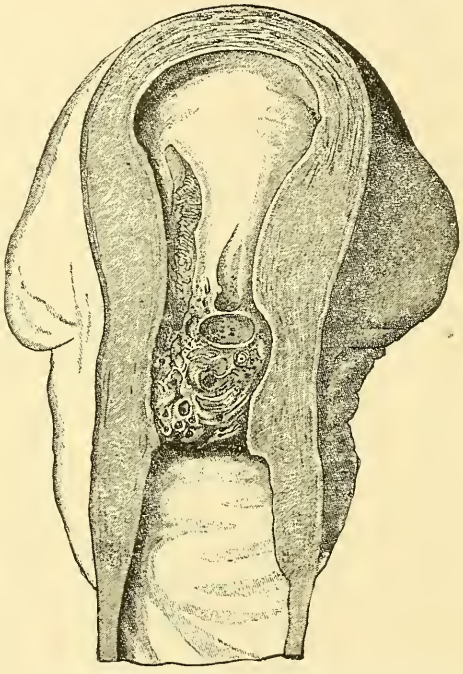

FIG. 175.—EPITHELIOMA OF THE CAVITY OF THE CERVIX. On the left is an extension toward the fundus of the uterus.

The experiments of Straus and Germont[4] on the effects of ligation of the ureters in animals, which confirm and explain the older observations of Aufrecht in Germany and Charcot and Gombault in France, clearly explain these lesions. They found that ligation produced a

progressive atrophy of the kidney which destroyed the distinction of cortical and medullary portions, and that the papillæ and pyramids disappeared. These lesions closely resemble those found at the autopsy of women dead of cervical cancer.[5] The ureters are dilated to the size of the external iliac artery, or even to that of the small intestine, their walls are thickened and at times tortuous; the pelvis of the kidney is distended, especially at the lower part, and of a conical or pyriform shape. When its dimensions are very large, it forms a

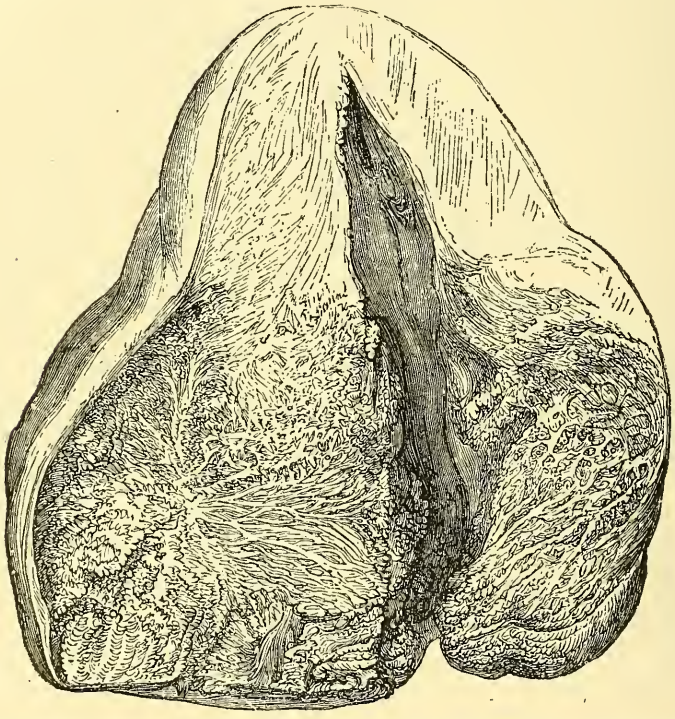

Fig. 176.—Encephaloid Epithelioma of the Cervix Invading the Body of the Uterus.

tumor which, according to Rayer's comparison, is covered by the remaining portions of the kidney as with a helmet.

The characteristic lesion is in the modifications of the pyramids and papillæ; the papillæ become flattened and their apices depressed, so that where there was a projection a hollow is formed. Later there is no trace of secreting tissue left, but in its place a fibrous membrane limiting a cavity crossed by the columns of Bertini, which persist for some time, so that the kidney has a multilobed and cystic aspect.

The cellular tissue which unites bladder and cervix may be invaded, then the bladder. Soon after there is a catarrhal inflammation produced; small sections of the bladder wall may slough or be eaten through by the morbid tissue, which penetrates the vesical cavity and establishes a fistula (Fig. 177).

Ureteritis and septic pyelo-nephritis are some of the first and gravest consequences of the bladder invasion; its result may be miliary abscess of the kidney, but this is less common than interstitial nephritis. In their statistics, which cover 51 cases, Caron and Féré[6] found suppurative pyelitis and miliary abscess 7 times; in all the

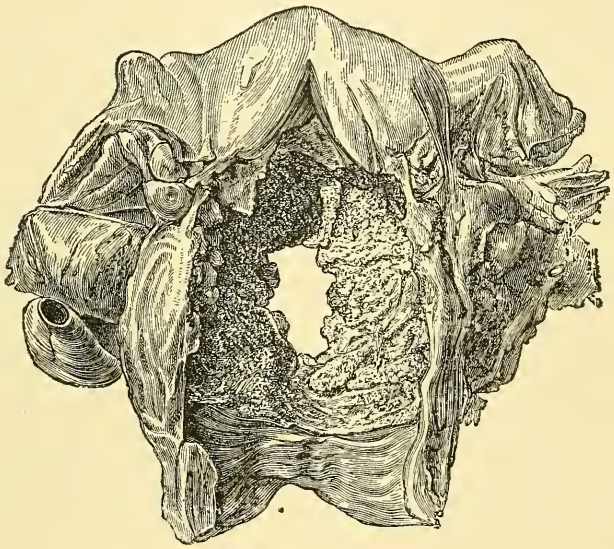

FIG. 177.—CANCER OF THE CERVIX WHICH HAS EXTENDED TO THE VAGINA AND PERFORATED THE BLADDER.

others there were only mechanical lesions, such as dilatation of the ureters, hydro-nephrosis and nephritis. Lancereaux, in 23 cases, has not described suppuration of the kidney even once.

We would expect that the heart would be influenced by this kidney lesion, and in certain cases there is found hypertrophy of the left ventricle, as Traube's theory requires. This theory is that the kidney lesion destroys a certain number of arterioles and lessens the circulatory domain, augmenting thus the inter-arterial pressure; to this is added the functional insufficiency of the kidney, which causes the retention in the blood of an abnormal amount of water besides the excrementitious matters; the cardiac hypertrophy is the direct neces-

sary consequence of these two factors. In a work intended to support this theory, Straus[7] cites 2 cases of cervical cancer with secondary nephritis and great hypertrophy of the heart; 4 similar cases are published by Artaud,[8] and still others by Weill and Thouvenet[9] in their theses. But in 1884 Lancereaux published a memoir based on 23 cases of his own observation, in which he reaches the opposite conclusion. In these 23 autopsies the heart was weighed and all its details carefully examined, and in 21 it was either normal or small and atrophied. Often it was soft and covered with fat on its anterior and basal surfaces. In only 2 cases was there any increase in weight and volume, and then there was also an arterial lesion (aortic endarteritis, or insufficiency) to explain the hypertrophy. This important series seems to be demonstrative. It is thus probable that the cardiac lesion accompanies the nephritis of cancer only exceptionally, in cases where the latter is of very rapid development.[10] There is still another lesion of the heart which is at times found at the autopsy of cancer of the uterus which Lancereaux calls "verrucous" endocarditis, and which he found twice among his 23 cases. Under this name he describes a special vegetating form of endocarditis which differs entirely from the ordinary inflammation which is present in cases of cachectic disease like tuberculosis; but the exact nature of the vegetations is not decided; probably they are of microbic origin.

The rectum is seldom involved and fistula of it is rare.

The peritoneum resists the ingrowth of the neoplasm by the production of adhesions which limit the disease to a small focus; thus it occurs that the recto-vaginal pouch appears to be so far from the vaginal cul-de-sac when we perform hysterectomy.

In very advanced cases we find the vagina transformed into a cloaca, opening both into the bladder and into the rectum; above, the lower pelvis is filled with a cancerous mass in which the fundus and adnexa can be recognized only with difficulty, being covered by adherent coils of intestine, which may also be perforated.

Lastly, there may be metastasis to distant organs, as the liver, kidney, stomach, and lungs.

The iliac, prevertebral, and inguinal ganglia are often involved. The inguinal ganglia, contrary to the general opinion, may be involved without disease of the vagina. The lymphatics of the cervix communicate with those of the body, and these again with the inguinal ganglia through the lymph vessels which accompany the round ligaments. This was described first by Mascagni and rediscovered by

Poirier.[11] Troisier has recently called attention to the adenopathy of the left subclavicular region which is at times produced, independently of the invasion of the lung and the pervertebral ganglia, in general or abdominal cancer, but especially in uterine.[12] It is probable, as Troisier supposes, that this isolated manifestation is due to direct infection of the ganglia by reflux of the lymph from the thoracic duct where the ganglia empty into it by short trunks. This curious anatomical fact is at the same time a valuable contra-indication to operation.

Among the deuteropathic and distant lesions may be noted fatty degeneration of the liver as described by Leca.[13] It appears that the septic material absorbed by the organism from the ulcerating surfaces acts like a steatogenic poison on the liver, as do alcohol and phosphorus. This fatty degeneration of the liver was long ago described among other surgical septicæmias by Verneuil.

Symptoms.—The onset of the disease is insidious, and there may be a long period during which it is latent and the patient preserves every appearance of health with a lesion already far advanced; for this reason it is unusual to observe the initial symptoms. The attention is first attracted by a small loss of blood at some other time than the regular period, after some exertion, especially coitus. But this accident, often happening in women who are approaching the menopause, is taken for an unimportant irregularity and passes unnoticed until by its repetition it becomes alarming. At other times these hemorrhages occur with some regularity every month and are viewed with satisfaction as a return of menstruation and the index of renewed youth.

The early bleeding does not come from an ulcerated surface, but is due to the complicating metritis, or simply to the congestion caused by the presence of the tumor; the process may be compared to the hæmoptysis of the first months of pulmonary tuberculosis.

At the same time leucorrhœa without any special characters appears; then the pain, the reflex phenomena from the digestive tract, the circulation and the nervous system, produce the pathological cycle which I have described in the chapter on metritis as the uterine syndroma. But the diagnosis must not be made without a local examination, in which the touch recognizes the induration, or papillary and ulcerated condition, of the cervix, and the speculum demonstrates the livid aspect of the tumor, the yellowish surface of the ulcerations, and the cauliflower or fungous vegetations.

Soon after follows the second stage, which may be called the period of acme, when all the symptoms are present; the hemorrhage becomes more frequent, there is a reddish discharge with a stale odor, or fetid and disgusting, and so copious and acrid that it causes erythema of the thighs and pruritus vulvæ, which are very distressing. At the same time the pain, chiefly lumbar, is very severe, and with it there are neuralgic radiations in different directions. By touch the vaginal pouches may be found free, but they are often already invaded, the uterus remaining movable or becoming more or less fixed by extension of the morbid process to the pelvic cellular tissue. The results of the local examination by touch are far more trustworthy than by the speculum; it is surprising, if the usual order is reversed, to see how the finger discovers alterations incomparably more extensive than those which can be seen. A cervix which seems to be a little swollen and ulcerated by the speculum is felt by the finger as a large tumor deeply changed by an already advanced process.

The digestive symptoms, anorexia, constipation, meteorism, etc., have by this time become of great importance and interfere with the general nutrition. With this condition begins the third stage, or the cancerous cachexia; the skin having a pale yellow tint which Barnes attributed to the absorption of fecal matters retained by the obstinate constipation (copræmia). The skin is also peculiarly harsh and dry. At this time also there may be present painful cystitis, intolerable neuralgia from compression or invasion of the nerves, phlegmasia alba dolens, and fistulas; local examination revealing wide extension of the neoplasm to the adjacent parts. There may coexist with all this successive attacks of subacute uræmia, and on analysis of the urine the excretion of urea is found to be subnormal, due not so much to the general enfeeblement as to insufficiency of the renal filter; the sign of these attacks is an exaggeration of the stomach disorder with vomiting.

The uræmia gradually becomes chronic and constitutes an actual source of comfort to the patient, as it blunts both intelligence and sensibility. After a few days in this condition, indifferent to all surroundings, semi-comatose and hardly responding to questions, the patient quietly dies; this is the usual history, convulsions of an eclamptic form being rare. I have seen one case of uræmia with dyspnœa. Peritonitis by extension or perforation, or embolism may cause a speedily fatal termination. It is evident that septicæmia may

enter largely into the production of the later effects; and if there is no proper treatment of it, this alone may be the cause of death.

Complicating Pregnancy.—Conception may occur with cancer of the cervix, as is proved by many cases,[14] although the conditions are very unfavorable to fecundation. It often happens that women return to their physician with a new pregnancy in whom a cancer had complicated the previous one. Cancer predisposes to abortion. In one hundred and twenty women with cancer of the cervix treated during pregnancy by Lewer at Guy's Hospital, forty per cent aborted.[15] Hanks[16] thinks that the abortion occurs most often in the third month, and that, if the patient passes this period in safety, the chances are that labor will take place at full term.

Chantreuil[17] cites three cases of prolonged pregnancy, the most interesting being a case of Menzies' of Glasgow. At times there is a series of ineffectual efforts at expulsion occurring at intervals and exhausting the patient, and in one of these the uterus may be ruptured.[18]

The prognosis for a woman with cancer is always aggravated by pregnancy, for abortion may cause a fatal hemorrhage or septicæmia, and when the case goes on to full term the labor is dangerous; Herman[19] found forty cases of death in labor in one hundred and thirty-seven cases of this kind. The older statistics show an even higher mortality, Chantreuil giving 25 deaths for 60 labors, and West 41 in 75. Among one hundred and twenty-eight children of cancerous mothers only a few were born alive.

Diagnosis.—I have already given the differential diagnosis between cancer before the ulcerative period and chronic metritis, and between cancer after ulceration and catarrhal metritis of the cervix (p. 343). Stratz lays much stress upon the yellow color and the brilliant granular aspect of non-ulcerated cancer.[20] In all doubtful cases a section should be cut and examined microscopically. If we are forced to wait, the course of the disease will remove the doubt; almost always where the nature of the disease is uncertain, it is not cancer.

The benign vegetations observed in vaginitis with mucous patches and papilloma could not be confounded with cancer; their multiplicity, their dissemination, and the characteristic cock's-comb aspect will prevent error, while the purulent excretion of vaginitis is very different from the reddish, fetid discharge characteristic of cancer.

A circumscribed, cancerous nodule in the cervix may be difficult to distinguish from a small myoma, though the latter is more clearly

defined and there is no sign of infiltration or inflammation about it; the mucous membrane is not adherent to the fibrous tumor, as it is to the cancerous.[21]

Certain cylindrical epitheliomata of the cervix present a polypoid appearance which might be confounded with benign mucous polypi;[22] in such cases the cancerous nodules of the uterine body and neck begin to project toward the exterior. A decision may be reached by dilatation and intra-uterine touch, or, if necessary, by exploratory curetting.

All these considerations apply to cancer at the very first; later on in the course of the disease, the invasion of adjacent parts, the progress of the ulceration, the frequent hemorrhage, and the abundant fetid discharge render the diagnosis easy. There is, however, an affection with which it may be confounded, namely, sloughing fibroma of the cervix, or polyp of the body arrested by strangulation or adhesions at the external os, which is dilated and partially effaced when the fibroma has been altered by spontaneous decomposition or by the application of caustics. Hemorrhage, fetid discharge, and a fungous or sphacelated appearance of the neoplasm all concur in making the case uncertain; the patient, exhausted by profound anæmia, seems to present the cancerous cachexia. There is but one symptom which removes the doubt, but it is pathognomonic: we should always seek for the external os, and in the case of a fibroma it will be found as a thin continuous collar about the tumor, and the tip of the finger may be introduced between the morbid mass and this diaphragm; frequently, also, the tumor is firm and free from ulceration along its margin. In one case of this kind I operated successfully and enucleated a sphacelated intra-cervical fibroma in a patient who had been sent away by a distinguished physician as afflicted with incurable cancer.

The following are exceptional forms of malignant disease of the cervix: Hegar[23] found a very rare form in an old woman, the hypertrophied cervix projecting beyond the vulva, with no ulceration. Eckhardt[24] observed in a young woman of nineteen years a considerable hypertrophy of the cervix which seemed to immediately precede its cancerous degeneration. Schröder found on autopsy a cancer of the upper part of the cervix, intra-cervical, of which there was nothing to be discovered externally.[25] Sarcoma of the cervix has been exceptionally observed, but so rarely that it cannot be considered a clinical entity; its variable manifestations might render diagnosis difficult.

Spiegelberg[26] described in 1878 a curious case which he called sarcoma colli hydropicum papillare (dropsical papillary sarcoma of the cervix) in a young woman of seventeen years. There was a papillary tumor of the anterior lip which returned six months after ablation and filled the whole vagina like a hydatid chorionic mole; the microscope demonstrated that it was a sarcoma with œdematous infiltration of its stroma. The same author observed a similar case

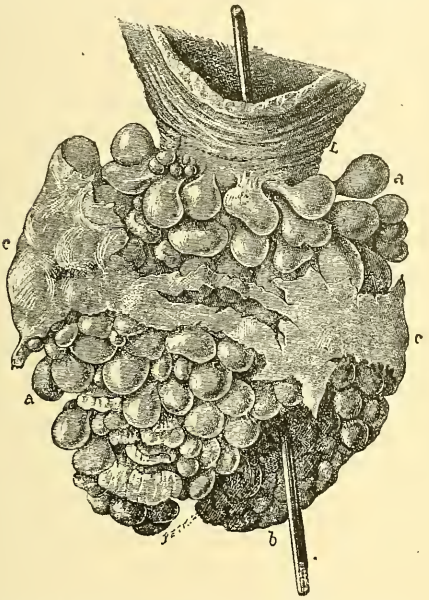

FIG. 178.—MYXO-SARCOMA OF THE CERVIX (PERNICE). *L*, Line of excision; *a*, *b*, lobules of the tumor; *c*, shreds of an enveloping membrane.

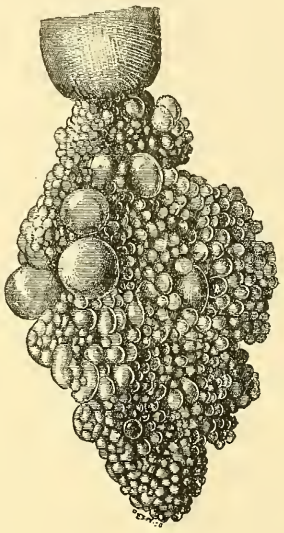

FIG. 179.—FIBRO-ADENOMA OF THE CERVIX (THOMAS).

in a woman thirty-one years old in 1878; and Winckler[27] cites a case of Sänger's which resembles it.

Ludwig Pernice[28] has given a description of a strio-cellular myo-sarcoma of the uterus, in the form of a bunch of grapes, in a nullipara who had suffered from hemorrhage for six months. The tumor started from the external os and was of the volume of about 10 cm. in all diameters, with lobules of a violet color filled with a gelatinous fluid; it was removed by the bistoury. On examination it proved to be a sarcoma mixed with striated muscular fibres of an embryonic appearance. Two months afterward it returned and was removed again, this time being nearly half as large as at first; and in nine months more the patient returned with a tumor which reached almost to the epigastrium. Exploratory laparatomy was performed and death followed

from pneumonia; the microscope showing that both the second and the third tumor were sarcomatous, but without any sign of myxomatous degeneration.

Mundé [29] has described a tumor which was evidently malignant and which he considered a myxo-adenoma transformed into a myxo-sarcoma, in a patient of nineteen years who had suffered from intense leucorrhœa and complete amenorrhœa for two years. The vagina was filled and the hymen protruded by a friable tumor composed of lobules of the size of a muscatel grape; on removal by the snare its centre was found to be fibrous, and it proved to have started from the cervix, in places showing a myxomatous degeneration of the vaginal culs-de-sac. One month and a half later it returned. Histologically it was composed of a multitude of myxomatous cysts, in whose fibrous stroma there were many lymph corpuscles and sarcomatous cells. It seemed to Mundé that it was a case of malignant degeneration of a tumor which was at first benign.

Thiede [30] has described under the name of fibroma papillare cartilaginescens a tumor observed in a woman of forty years, lobulated and spongy in appearance, taking origin from the mucous membrane of the cervix. Its ablation was followed by recurrence and death. On section there were found islands of hyaline cartilage in a stroma rich in dilated vessels, but none of the characters of a sarcoma. To this may be compared Rein's case [31] of what he calls an arborescent enchondromatous myxoma of the cervix, found in a patient of twenty-one years, the tumor being lobulated and soft. It was removed entire, but rapidly returned, and caused death. On section the soft tissue was found to be subdivided by bands of fibrous structure surrounding masses of aspect and structure like Wharton's jelly, and in the middle of these myxomatous portions there were nodules of hyaline cartilage.

Lastly, Winckel [32] describes a myxomatous adenoma of the cervix which he removed from the anterior lip of the uterus of a woman forty years old, with rapid recurrence and invasion of the vaginal pouches, when the patient passed out of his observation. On section the tumor was full of alveoli containing mucus, and the microscope proved that it had probably been at first an adenoma which then became transformed into a sarcoma and then underwent myxomatous degeneration. This singular hybrid neoplasm established, according to this author, a transition between epithelioma and sarcoma.

All of these rare cases deserve mention, but their differences in-

terest the pathologist more than the clinician; they are all malignant tumors and may be called cancer.

An important part of the diagnosis is the determination of the tumor's extension. Bimanual palpation, with systematic infra-traction of the uterus, will furnish the needed information on this point, and, if necessary, anæsthesia may be employed to facilitate the examination, which is so important from the operative point of view.

Prognosis.—Cancer in all its forms runs a fatal course, but some forms develop more slowly than others; for example, scirrhus cancer of the cavity.

The average duration of the disease is from sixteen or seventeen months, according to Courty, to twelve months (Gusserow); but Simpson says two or two and a half years, and Fordyce Barker up to three years and eight months. Arnott, who has published scanty but well-studied statistics, assigns to carcinoma (of the cavity?) a duration of fifty-three to fifty-four weeks, and to epithelioma (papillary) eighty-two to eighty-three weeks; cases of longer duration have been cited. Courty [33] speaks of a woman who lived seven to eight years, Fordyce Barker [34] of one who lived eleven years, after the first signs were discovered, and Emmet [35] asserts that he has seen life prolonged from five to eight years; these cases may be compared to certain forms of atrophic scirrhus of the breast.

The age of the patient is of great importance. Generally, cancer at the age of twenty or thirty develops more rapidly than at the time of the menopause; with tumors of a galloping course, where there is rapid return even after hysterectomy performed under the most favorable conditions, the patient is generally young.

The form of the tumor should also be considered in the prognosis. It may take years to develop those of the cavity and the hard variety with but little bleeding or vegetation, especially if the patient is of advanced age.

Etiology.—Women are more subject to cancer than men, and it is the uterus which is most frequently attacked. This fact has been proved beyond doubt by J. Y. Simpson's statistics in the "Annual Report of the Registrar-General for England" of the years 1847–61.

During the period which may be called the uterine life of the woman this frequency is most manifest; that is, from puberty to the menopause when it attains its maximum. After the uterus, the breast is most often attacked.

Race, heredity, age, and environment are general predisposing

causes: the influence of race in the United States, where it can be well studied, is to the benefit of the negress, in whom cancer of the uterus is so rare while fibroma is so common. According to Chisholm's statistics, nearly one in every one hundred whites die of cancer and only one in three hundred blacks, both sexes included.

The force of heredity has been disputed. In collecting the statistics which he first published, Schröder found in nine hundred and forty-eight cases that this factor could be determined in only seventy-eight. I have seen many incontestable cases.

The period at which it most frequently develops is between the ages of forty to fifty years. Examples are known of very early development of cancer of the cervix. Ganghoffer records the case of a child of nine who for two years had had losses of blood together with an ulcerating tumor which filled the vagina. The child died of variola a few days after its excision and cauterization. Microscopic examination by Chiari proved it to be a medullary carcinoma, probably from the glands. The principal statistics are combined in the following table by Gusserow,[37] who has added to his own results those of Lever, Kiwisch, Chiari, Scanzoni, Säxinger, Tanner, Hough, Blau, Dittrich, L. Meyer, Lebert, Glatter, Beigel, Schröder, Schatz, Winckel, and Champneys; in all 3,385 cases:

AGE AT WHICH CANCEROUS DISEASE BEGAN.

17 years,	1 case (Glatter)
19 "	1 " (Beigel)
20 to 30 "	114 cases
30 " 40 "	770 "
40 " 50 "	1,196 "
50 " 60 "	856 "
60 " 70 "	340 "
above 70 "	193 "

Unsanitary environment, with privations leading to poor nutrition, favor the development of cancer, so that it is most often observed in the lower classes of society; the opposite is true of myoma.

Schröder has drawn up comparative statistics of the cases he has seen in hospital and private practice, which are of great interest—

	Myoma.	Cancer.
In 14,000 hospital cases,	385 (1.9%)	
" 16,800 " "		603 (3.6%)
" 9,400 of private practice,	537 (5.7%)	209 (2.1%)

Martin has made a similar list, and finds that three per cent of his hospital cases were cancerous, and a slightly large proportion myomatous; in his private practice the results were like Schröder's.

Local predisposing causes which have been mentioned are, laceration and metritis of the cervix (Emmet and Breisky); Mangin[38] has made histological researches on the point of great interest. He also instances the effect of repeated parturition, but it is possible that this repetition acts only by the lacerations and inflammations which are its consequence.

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CHAPTER XV.

TREATMENT OF CANCER OF THE CERVIX.

The treatment of cancer may be divided into two sections according as it is palliative or radical; the latter is possible only when the tumor is limited to the uterus itself without invasion of other parts. Palliative treatment is addressed to cancers which have passed beyond the limits of the organ where complete ablation would be either impossible, too dangerous, or useless.

I. Cancer of the External Os Not Involving the Vaginal Culs-de-sac.

Until recently no attempt was made toward a radical cure of uterine cancer unless the neoplasm was limited to the vaginal portion of the cervix, and in such cases intra-vaginal amputation was performed. The operation has given good results in the hands of Verneuil, who uses the écraseur, C. Braun, who employs the galvano-caustic loop, and Schröder,[1] who advises a cutting instrument, which I consider both quicker and safer. Very brilliant results have been credited to both these methods, but in many of the older cases there is an uncertainty of diagnosis. Pawlik's[2] statistics from Braun's clinic cover about twenty years: In 136 intra-vaginal amputations of the cervix by the galvano-caustic loop, 9 died from the operation (6.6%); 33 cases were followed more than one year (24%); 26 more than two years (19%); 2 were still exempt at the end of twelve years, 1 at the end of nineteen and one-half. Verneuil in October, 1888, reported 22 operations by his method, with 1 death. Polaillon, who used the galvano-caustic loop, had 1 death (from chloroform) in 200 cases. Marchand, in 12 cases, 4 by the écraseur and 8 by the galvanic loop, had 1 death from opening the peritoneum and peritonitis. Terrillon had 7 cures. Adding one case of Schwartz's we obtain 60 amputations of the cervix, with 2 deaths from operation (3.33%). Among these Verneuil has 1 case of cure of seven years' standing, 1 of five years, and 1 of three years; 2 of six years and three years, respectively, presented a return of the disease in the pelvic ganglia.

Polaillon gives 1 case of cure after seven and 1 case after five years; Marchand, 1 case after seven and 1 after five years; Schwartz 1 after four years.[2]

I consider the employment of the bistoury superior to all other methods of excision, for it permits an operation which is thoroughout intelligent and not mechanical, and by it the ablation may be carried as far upward as may be necessary. I therefore use the cutting instrument according to the rules already given under the treatment of metritis (pp. 207, 208). As I have said before, when the lesion is cancerous, no matter how small, I perform total hysterectomy;[4] yet the great authority of my illustrious master Professor Verneuil will not permit me to omit the description of the operative details of amputation of the cervix by the écraseur.[5] The greatest care must be exercised, in applying the instrument, to avoid all upward displacement of the chain, for it has happened that by this accident the recto-vaginal pouch has been opened with a fatal result.

Verneuil's Method of Intra-vaginal Amputation of the Cervix.

First Step—Perforation of the Cervix.—The patient is placed in the lithotomy position, the fourchette depressed by a Sims speculum, and the cervix drawn down by a Museux forceps. A trocar is passed in upon the finger introduced into the posterior vaginal pouch and the uterus pierced perpendicularly to its axis, the index finger being placed in the anterior pouch to determine the point where it shall pass out, the Sims blade being removed for the purpose, and the cervix drawn down by an assistant. When the cervix has been pierced through, the stylet is withdrawn and replaced by a small urethral bougie, which is seized with forceps and drawn to the vulva; the canula of the trocar is then removed. By means of the bougie, two strong ligatures, about fifty centimetres in length, are then passed through the cervix and the ends brought out of the vulva. One of these loops serves to pass the first chain and the other to fix and draw down the cervix; the hooks or forceps are no longer of use and may be removed. In the absence of a curved trocar, a long and strong channelled sound may be employed (Broca), such as is used in linear rectotomy. After giving it a convenient curve, about like that of a Cooper's needle, it may be well sharpened for its passage through the uterine tissue, and a sharp stylet guided along its channel to carry the ligatures as described above.

Second Step—Introduction of the Chains.—The only precautions needed in this step will be, care to turn the concave side of the chain toward the cervix, in tightening it to pass well beyond the limits of the disease, and to apply it as perpendicularly as possible to the axis of the part. For the latter purpose, an assistant may draw down the uterus with the other ligature, turning it toward the side opposite the chain, while the rigid handle of the écraseur is carried upward and the constricting loop is held on the nail of the index finger until it has traced its furrow in the cervical tissue.

Third Step—Section of the Cervix.—If we wish to have the operation really bloodless, it must be performed very slowly. When the chain is tight enough to feel the resistance of the tissues, it is increased by one notch every thirty seconds; and when a peculiar sound announces that the tissues have yielded to the pressure, the interval is lengthened by ten seconds. It is important to keep this up till the very last notch, or there will be hemorrhage during the final minutes of the operation. Two écraseurs may be employed, the second being passed as the first, and thus the operation much shortened. With but one we proceed as follows: Before the section is entirely completed, the second ligature is used to tie the other half of the cervix perpendicularly to its axis; then, when it is finished, the chain is placed in the furrow of this ligature and the section completed.

Dressing and After-treatment.—The section accomplished, the part excised should be examined with great care to see that all the diseased tissue has been removed and that the peritoneum has not been included; if not, then a gentle injection of a carbolic solution (1 : 50) is kept up till the fluid returns clear or but little tinged with blood.

If, however, there is a wound of the peritoneum, it must be closed with a few points of suture, although nature alone will sometimes occlude it. If the examination of the wound shows that certain portions of diseased tissue remain, Lisfranc's or a boxwood speculum may be introduced and the last vestiges of the neoplasm destroyed with the thermo-cautery or the sharp curette.

The dressing is very simple. Verneuil places in front of the vulva a compress of iodoformed or carbolized gauze.

For my part, I think that total hysterectomy is preferable to removal of the cervix, even when the disease is circumscribed, for it alone gives security that the whole of the affected part has been removed, and the mortality of the operation has been so far reduced that it does not materially exceed that of cervical amputation.

II. Cancer of the Entire Cervix, without Extension to the Culs-de-Sac.

In this condition intra-vaginal amputation will not suffice, for it does not include the whole of the disease. We therefore practise the supra-vaginal excision, a conical excision similar to that which Huguier long since applied to another affection and which many surgeons independently of each other have practised under different names. Kœberlé[6] has "for nearly twenty years" performed a conical excision with the bistoury, using a sound in the cervix as a guide, and "roasting" the stump with the thermo-cautery. Baker, of Bos-

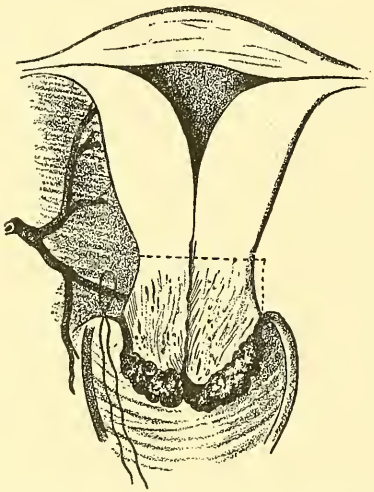


Fig. 180.—Supra-Vaginal Amputation of the Cervix, showing the Extent of the Excision and the Ligature of the Lower Branch of the Uterine Artery.

ton,[7] also employs the "high amputation," followed by the hot iron, and Ely van de Warker[8] does the same, cauterizing with chloride of zinc.

Schröder has made the operation general, and best described the indications and technique under the name of supra-vaginal amputation of the cervix.[9] According to him there is a fundamental difference between cancroid (epithelioma) of the cervix and all other forms of cancer. He believes it to be a local affection, with no tendency toward propagation to the body of the organ if the cervix is freely excised, the limits of the disease being passed by from one to one and a half centimetres.

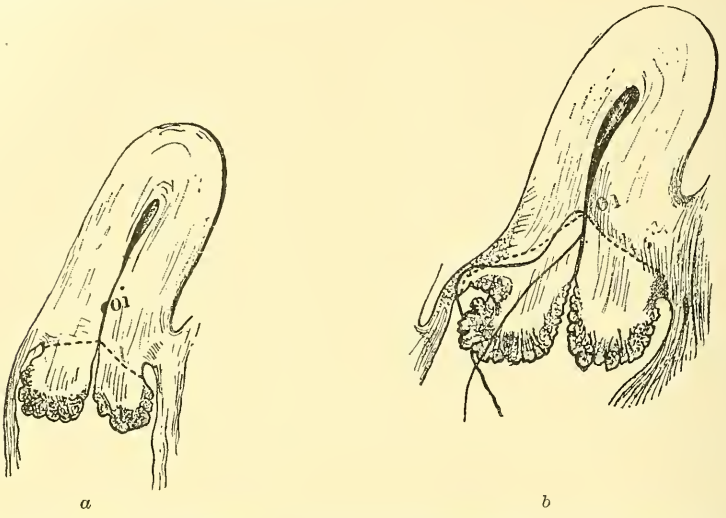
The technique is as follows: The diseased cervix is brought

down to the vulva by Museux forceps and a strong loop of thread is passed through and above each of the lateral culs-de-sac (Fig. 180). These loops serve to draw the parts down, and to compress the uterine artery.

A transverse incision is then made across the anterior cervico-vaginal junction, at least one centimetre from the diseased part, extending into the connective tissue. The bladder is then easily separated over a large extent by tearing the loose connective tissue between it and the cervix. The forceps are then elevated so that the posterior cul-de-sac is exposed, and a transverse incision made through the vagina as before, with usually some difficulty in separating the peritoneum from the posterior vaginal wall. If from the extent of the disease we are obliged to make this latter incision high up on the vaginal wall, the peritoneum is likely to be opened, and if this is avoided, there is still the danger of wounding it in several points during the separation of the vaginal tissues. The serous membrane is easily recognized, even when not wounded, from its bluish and transparent appearance; but opening it is a matter of indifference when the operation is antiseptic, and it is only necessary to close it with a few sutures and cut the ends short. When the vagina is thus divided in front and behind, the incisions are prolonged laterally till they meet, and the separated cervix detached from its connections by the finger. It is difficult to do this on the sides, for there the connective tissue is dense and the vessels enter the uterus. Before the latter are cut they should be tied, a second ligature being applied if necessary. Then when the cervix is free enough, its anterior wall is incised with the bistoury as far as the canal, and sutures are passed through the anterior cul-de-sac and along the posterior wall of the bladder, traversing the uterine wall and coming out in the cervical canal (Fig. 181). These are then tied, embracing the parts deeply and closing the wound in the connective tissue so that the cut surface of the anterior vaginal wall is applied to the cut surface of the cervical mucous membrane. Then the posterior lip of the cervix is divided, the sutures preventing the stump from escaping upward, and sutured in the same manner. The union of the parts is then completed by lateral sutures, and the entire bleeding surface closed by ligatures placed as deeply as possible.

This operation permits the complete removal of most of the vaginal cul-de-sac, the entire cervix and a part of the uterine body; Schröder has also excised at the same time the upper portion of the vagina.

Hofmeier[10] has published the results of Schröder and some of his assistants from the beginning of 1879 to the end of 1884; in 105 partial extirpations there were but 10 deaths, or 9.5%, and the final results were excellent. In Germany this operation has been performed by Gusserow;[11] in America by Baker and Reamy;[12] in England by Spencer Wells and Wallace;[13] and in France by Kœberlé,[14] Marchand,[15] Buffet,[16] Tédenat,[17] etc.



a *b*

FIG. 181.—AMPUTATION OF THE CERVIX. *a*, Intra-vaginal operation; *b*, supra-vaginal operation, showing line of incision and suture; *oi*, internal os.

Combining the statistics of Hofmeier, Gusserow, Baker, Reamy, Wells, and Wallace, we obtain 221 cases, with 26 deaths, or 11.5%; those of Hofmeier and Baker, which alone are complete from this point of view, show more than 50% of cures after two years. I find, with Barraud, that this proportion is "truly too fine," completely disagreeing with the general prognosis of cancer. It seems to me that it affords the best demonstration of the numerous errors of diagnosis which lie hidden in this extraordinary series, upon which many of the arguments against early hysterectomy have been based.

In spite of the ardent discussions in France and elsewhere, surgeons are not agreed in the choice between total and partial excision, and it is probable that the opinion of the majority of the partisans of the latter operation would be modified if it were demonstrated that the mortality of hysterectomy is not sensibly higher than that of excision of the cervix; however, this demonstration is to-day almost made. The gloominess of the early statistics was due in part to the inexperi-

ence of many of the operators, the performance of radical operations in unsuitable cases, and the absence of a perfect technique. Since these causes of failure have disappeared, the mortality has fallen to 5.88% in France.[18] Leopold[19] from 1883 to 1889 did 80 vaginal hysterectomies for cancer, with only 4 deaths, or 5%; the last 52 of this series were followed by cure. Dmitri Ott, of St. Petersburg, had 30 cases without a death.[20] These examples are eloquent. They prove that by attacking cancer at the first and performing hysterectomy in cases which used to be treated by partial excision, we obtain a mortality which does not surpass that of cervical amputations. I cannot repress the thought that hæmostasis and antisepsis are far easier in total hysterectomy than in supravaginal amputation; and in fact the last operations of this kind, both in and out of France, have not given more than 11% of deaths. The great argument against early hysterectomy is thus ruined and the indications for speedy interference strengthened. The chief of these appears to me to be the impossibility, in the majority of the cases, of knowing whether the disease is circumscribed or whether it is travelling by the mucous membrane toward the body of the uterus. Examinations by touch and speculum are always uncertain on this point and expose us to cruel mistake. I have recently seen a case of this anatomical condition which escaped clinical examination where, after performing total hysterectomy for an epithelioma which seemed confined to the lower part of the cervix and for which either the high or the low amputation appeared suitable, it was easy to determine on the extirpated tissues the presence of a band of neoplasm reaching up toward the fundus.[21]

A second, more unusual mode of hidden propagation where there is a small cancer in the cervix, is by the formation in the body of the organ of a series of metastatic nodules not admitting diagnosis upon the living patient. Cases of this kind have been cited by Ruge, Binswanger, Düvelius, Terrier, Strotz, and Abel,[22] and, although rare, must not be neglected. Let me also call to mind the observations of Abel and Landau on serious changes in the uterine mucosa with epithelioma of the cervix; for while it is not proved that these alterations are sarcomatous, yet they undoubtedly produce a locus minoris resistentiæ and favor recurrence.

III. Cancer of the Cervix, with Extension to the Body of the Uterus, without Invasion of the Adjacent Tissues.

In cases of this character there is but little discussion concerning the best method of treatment, the majority of gynæcologists favoring the performance of total hysterectomy by the vagina.

This operation [23] is not of recent origin, having been known for nearly half a century under the name of colpo-hysterectomy. It fell

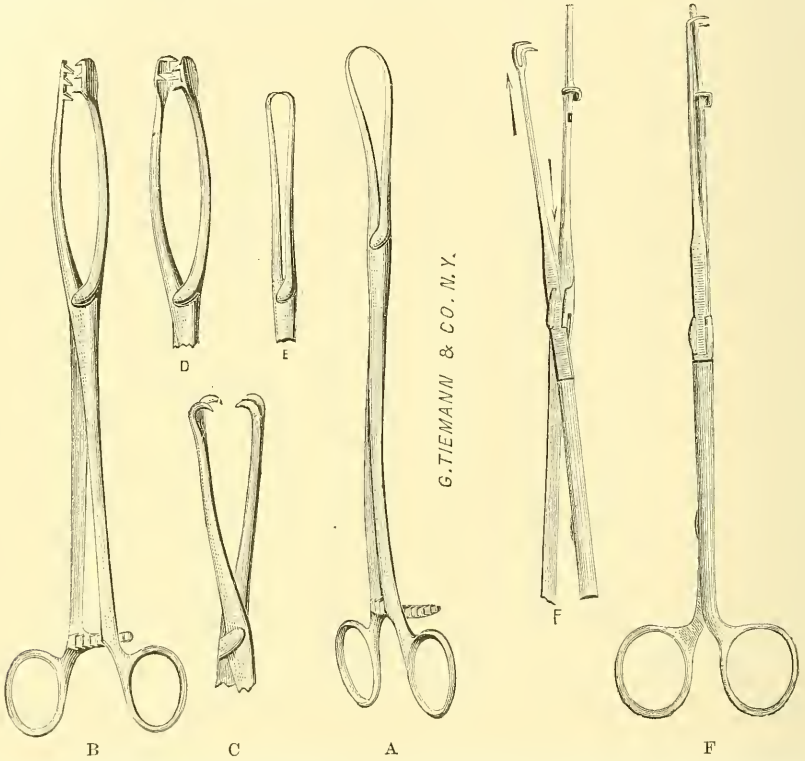


Fig. 182.—Various Models of Prehension Forceps for Grasping the Cervix Uteri in Hysterectomy. *A*, *E*, Hook forceps; *B*, *D*, flat with internal teeth; *C*, with blunt hooks (Collin); *F*, *F*, with gliding hooks (Collin).

into disfavor on account of its excessive mortality until recently, when Czerny prepared the way for its revival, after the greater dangers of total extirpation by the abdominal method (Freund, 1878) had made it necessary to seek other means of relief.[24]

Colpo-hysterectomy or Vaginal Hysterectomy.—Before operating it is necessary to make certain, by careful examination of the patient, that the uterus is movable and the broad ligaments free from disease; for this purpose bimanual palpation, rectal touch, and down-

ward traction with fixation forceps are indispensable. At times, in doubtful cases, to overcome the contractions of the abdominal muscles and render the tissues lax, or to eliminate timidity in a nervous patient, it is well to make a preliminary examination under chloroform.

Another preliminary precaution consists in as complete disinfection as possible of the vagina for several days before the operation.

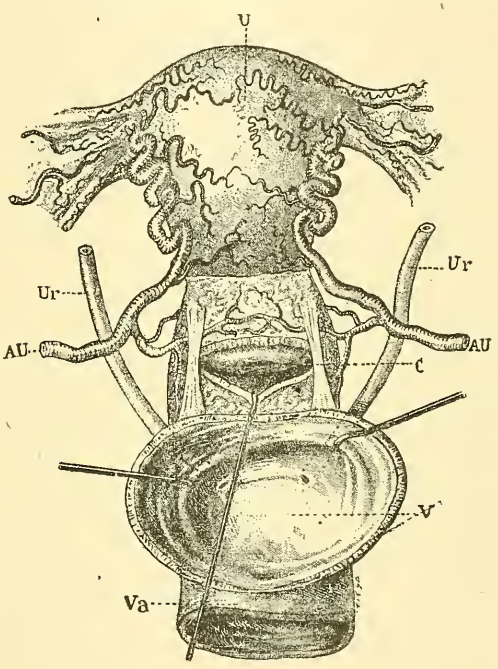


FIG. 183.—RELATION OF THE URETERS AND UTERINE ARTERIES TO THE CERVIX. *U*, Uterus; *Ur*, ureter; *A U*, uterine artery; *C*, cervix uteri, displayed by a transverse incision of the anterior vaginal cul-de-sac; *V*, section of the bladder at the level of the entrance of the ureters through its walls; *Va*, vagina; two bands of fibrous tissue are seen to unite it laterally with the uterus. We can distinguish on the cervix the part not covered by peritoneum, which adhered to the bladder before dissection.

If the cervix is covered with friable vegetations which are causing a fetid discharge, they must be curetted a week before we operate, with a subsequent application, if necessary, of some hæmostatic like chloride of zinc (1 : 10) or the actual cautery, and then the operative field must be cleansed and guarded against infection. As this procedure causes but little pain, it is not necessary to employ anæsthesia. Thorough irrigation with sublimate solution (1 : 5,000) twice a day, and the application of iodoform tampons in the interval, complete the preparation.

Three hours before the operation the patient should take a large, simple enema, and immediately beforehand an assistant who is not to have any part in the hysterectomy should determine by rectal touch that the large intestine is entirely empty; if it still contains fecal matter, an injection of hot water is at once given and the fæces removed with the aid of the finger; then the rectum is cleansed by an injection of a saturated boric-acid solution. The bladder is to be emptied at the beginning of the operation by one of the assistants.

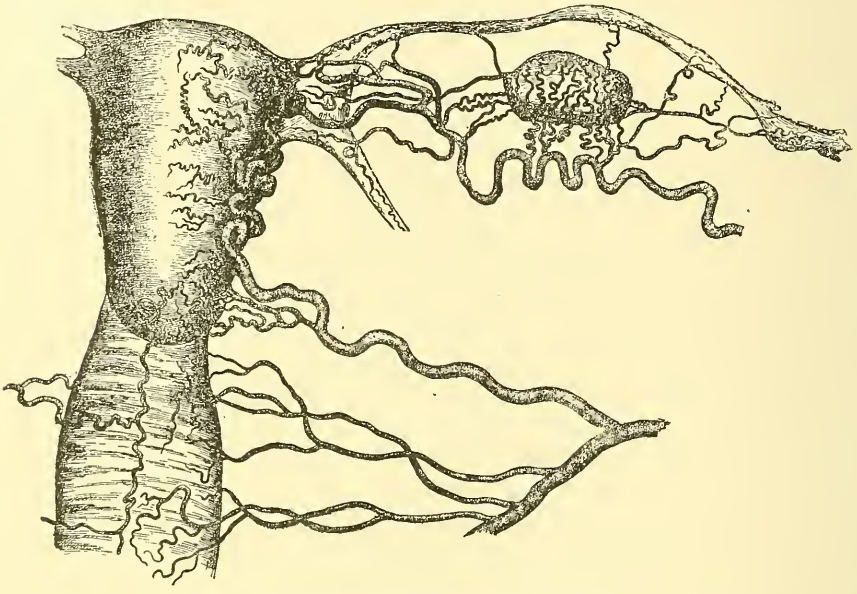


Fig. 184.—Vessels of the Uterus; Uterine and Utero-ovarian Arteries.

The patient is anæsthetized and placed in the dorso-sacral position, an assistant on each side taking one of the flexed thighs under his arm while his other remains free to assist. The fourchette is depressed by a univalve speculum and the lateral parts held aside by retractors. The cervix is seized with Museux or other fixation forceps (Fig. 182) and continuous irrigation of the field of operation gently begun (Fig. 11, p. 17).

First Step. Opening Douglas' Pouch and Vagino-peritoneal Suture.—The cervix is drawn strongly forward so as to stretch the posterior vaginal pouch as much as possible, which is then incised transversely down to the peritoneum, across its whole width.

The index finger of the left hand is passed into this opening, and with a strongly curved needle a series of sutures is inserted throughout

the whole extent of the section, taking in the entire thickness of the tissues up to the peritoneum and including it. By this procedure [25] we obtain a perfect hæmostasis of the vaginal vessels, which are often the source of bleeding troublesome by its persistence, and the cellular interstices are closed and protected from laceration during the subsequent manœuvres (Fig. 185).

It may happen that the posterior vaginal insertion is very thick, or that the cul-de-sac of Douglas is partially closed by adhesions; in these instances, where the dissection must be carried very high, it is well to insert two superimposed planes of suture.

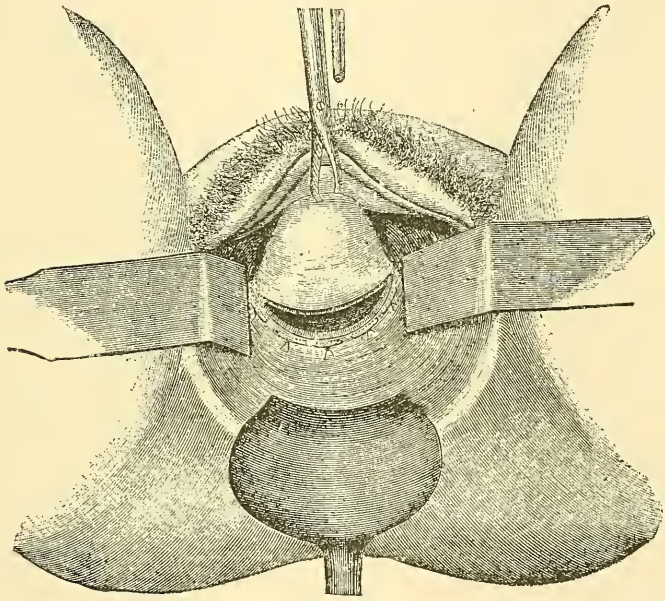


Fig. 185.—Vaginal Hysterectomy. First step, opening the posterior cul-de-sac and suture of the peritoneum to the vaginal mucosa (Martin).

Second Step. Hæmostatic Suture of the Pelvic Floor [Ligation of the uterine artery].—The needles are now changed for those which are less elliptical, stronger, and of greater length; Deschamps' pointed needles are the best for this special step. With them two large sutures are placed on each side of the opening, which include the posterior part of the lateral vaginal pouches in mass, going deeply to seize the inferior branches or the trunk of the uterine artery, at the base of the broad ligament. During this manœuvre it is best to place the index finger in the opening, and press the base of the ligament strongly forward so that it is carried in front of the needle (Fig. 186).

The needle enters two centimetres from the angle of the wound, while the finger feels for its point, and it emerges about one centimetre from its point of entry. Very strong silk is used for this suture, and tightly tied. One or two other points are then sutured in a similar way, the first being anterior and very near the cervix; and thus all the vessels are obliterated before the early steps of the operation are completed. There is no danger of including the ureter, as it is situated more in advance, and also is strongly drawn upward by the traction upon the cervix.

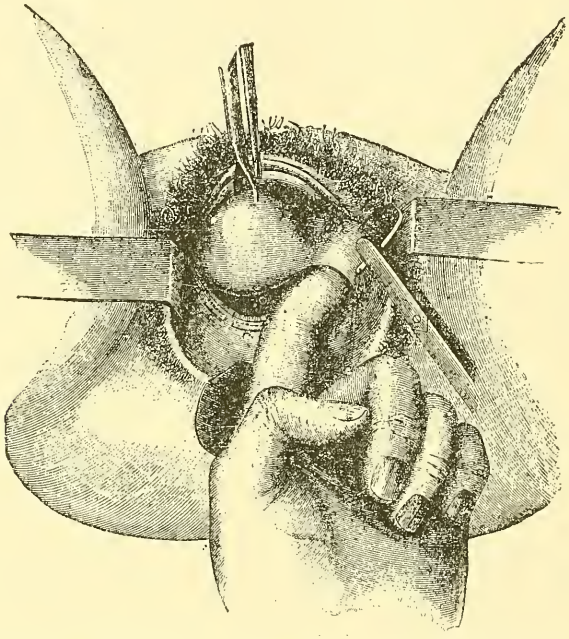


FIG. 186.—VAGINAL HYSTERECTOMY. Second step, ligation of the uterine artery (Martin).

Third Step. Complete Circumcision of the Vagina and Liberation of the Bladder.—The cervix is carried backward to stretch the anterior cul-de-sac, and the incision of the vagina completed in front, using great care to keep as near the uterus as possible, so as not to injure the bladder, and yet to avoid the diseased tissues. For the same reasons the edge of the knife is to be directed obliquely toward the cervix. When the vaginal incision is accomplished, the knife is laid aside and the part dissected from the bladder with the finger; occasionally the scissors will be needed for this part of the operation. We need to remember that the extent and strength of these connec-

tions vary much in different subjects. At the end of a short interval the finger appreciates the lack of resistance before it which indicates that the peritoneum has been reached and the limit of the attachment of the bladder; the serous membrane may sometimes be seen at the bottom of the wound, recognized by its bluish appearance. Many surgeons incise it at this moment, but I prefer to wait so that the uterus, when it is inverted, may not carry the ulcerated surface of the cervix within the cavity. The dissection should not be carried much farther forward without arresting the hemorrhage, which is very slight, by points of suture placed on the cut surface of the tissues.

Fourth Step. Displacement Backward of the Uterus and Ligation of the Broad Ligaments.—The cervix is now free to its upper limit. It should be drawn well forward, while the posterior portion of the wound is depressed with a single blade or retractor, and then the uterus is seized behind with a curved Museux forceps and made to turn over within the wound, the forceps on the cervix being first removed.

At times there is some difficulty in effecting this manœuvre, most often because the cervix is not entirely freed from its connections—a procedure which must be completed as soon as the ligation of the pelvic floor has rendered the parts exsanguine.

Different instruments have been invented for this inversion of the uterus; Martin employs a sound introduced into the cavity; Quénu uses a double-branched hook; I think that all these instruments are not free from inconvenience or danger. If, from the presence of a fibroma or an adhesion or some other cause, the uterus is not easily inverted in spite of liberation of the cervix, it is best to draw it directly down and tie the broad ligaments *in situ*. Müller has proposed to split the organ in difficult cases and extract each half separately.

When the uterus has been inverted, the superior portion of the broad ligaments is found below and their base above. They should be ligated in three parts unless there is any need of intercrossing the threads for a chain suture. The left ligament is first tied and cut. Before detaching the uterus completely the last portion of the ligament is to be united by single sutures to the commissure of the vaginal wound. The right side is then treated in a similar manner, and the operation is terminated by severing the last bands which retain the uterus, particularly the peritoneum of the anterior cul-de-sac which has been so far retained as a barrier against possible infection

from the inverted cervix. The wound is then cleansed with great care by small tampons of antiseptic cotton.

Fifth Step. Drainage and Dressing.—One point of suture in each commissure of the vaginal wound diminishes it enough without closing it entirely. Before tying the threads, I place in the retro-peritoneal pouch a piece of iodoform gauze, doubled, to act as a drain, its two ends being rolled up in the vagina and tied with a thread so that they may be recognized. Other pieces of the gauze, lightly packed, complete the dressing. It is to be renewed according to the amount of serous or bloody oozing, leaving in place the strip of gauze in the cul-de-sac to perform the office of a drain; the latter is not removed till the end of six to eight days.

I much prefer this mode of drainage to the rubber tube in the form of a cross which Martin uses, or the glass tube of English writers, or the double tube coupled like a gun barrel of certain French surgeons.[26] As to the complete occlusion of the wound, it was advocated by Mikulicz at the Surgical Congress of Berlin in 1881, but to-day it has, with good reason, very few partisans, other than Hegar and Kaltenbach.[27]

The next question to be decided is as to the removal of the adnexa. If the ovaries and tubes are prolapsed into the wound, they should be excised, but when they must be searched for, the indications differ according as the woman has or has not reached the menopause; in the latter case it is necessary to remove organs whose function might continue for some time (for ablation of the uterus does not always produce ovarian atrophy) and thus give rise to accidents.[28] We proceed then rapidly to search for the adnexa, whose removal is generally easy. If there is much difficulty, but little time should be lost over this manœuvre. Brennecke has reached the conclusion that in view of their final atrophy removal of the adnexa is of comparatively little importance—an opinion which is apparently contradicted by the experiments of Grammatikati and Glaevecke,[29] which indicate that the function of the ovaries continues but is tolerated by the peritoneum.

The final treatment is very simple. If the iodoform tampons are not saturated with blood, they are left in place four days; then they are removed. The strip which acts as a drain is withdrawn at the end of the first week, for the peritoneal wound has then long been closed by exudation. It is none the less necessary to be very careful in the use of vaginal injections—not to employ them under eight days and then with but little pressure, keeping the fourchette depressed (subli-

mate 1 : 5,000). The patient may leave her bed at the end of three weeks, and at about the same time the points of silk suture at the bottom of the vagina should be removed. This usually requires two sessions, at intervals of a few days, before it is accomplished. It is not well to neglect them, because they produce a purulent discharge during their spontaneous elimination. For the first twenty-four hours the patient takes nothing but a little ice, to control vomiting from the chloroform. At the end of the third day I give a laxative enema. Convalescence should be without any elevation of temperature.

This operative technique, which I have adopted and which differs but little from that of Martin, is the one that I recommend, though I will also describe certain modifications of the operation which the names of their authors have invested with a certain authority.

Modifications of the First, Second, and Third Steps.—Fritsch [30] begins by a dissection of the lateral cul-de-sac, searching for the uterine artery and tying it; then he proceeds to the dissection of the bladder, and ends by the incision of the recto-vaginal pouch. Olshausen [31] defers the opening of the cul-de-sac as long as possible, for fear of infecting the peritoneum. Schatz [32] reserves the separation from the bladder for the final step. Sänger and other authors advise the operator to open the vaginal pouches by means of the actual cautery, but this makes subsequent dissection difficult, and is without real advantage. To prevent hemorrhage from the ulcerated surface of the cervix, Fritsch places an elastic ligature at its base before dissecting. Müller compresses the abdominal aorta during the operation.

It is sometimes necessary in cases with very narrow vagina or introitus, as from the presence of the hymen, from senile atrophy or circular bridles, to obtain greater working room by incising the perineum and afterward suturing it. I have obtained great assistance from this procedure.

For fixation of the cervix, which is so easily torn, many different forms of forceps have been invented. Brennecke's model [33] is introduced into the cavity of the cervix, and then the hooks are made to project and implant themselves in the healthy tissue, so that there is no fear of their tearing out. The Museux forceps which are exactly apposed, and the bullet forceps seem to me to be sufficient. Müller [34] after ligation of the broad ligaments in mass, divides the uterus into halves, and other authors advise its removal by fragments; all such methods lead to infection of the wound.

Modifications of the Fourth Step.—Billroth, Leopold, and Ols-

hausen do not employ the inversion of the uterus, but by strong traction pull down the organ and detach it by degrees, carefully ligating each portion of tissue before dividing it, thinking that the inversion leads to infection of the wound; but this danger is almost wholly prevented if the cervix has been curetted and disinfected several days before the operation, and if the anterior peritoneal pouch is preserved till the last to act as a barrier. Czerny, Fritsch, and Demons revolve the uterus forward—a procedure which is rendered easy by the frequent presence of anteflexion and the fact that the resistance of the round ligaments does not have to be overcome. Martin and Schröder reverse the uterus posteriorly, and, as I have said, Martin in difficult cases introduces a kind of mandrel into its cavity for the purpose, and Quénu has proposed a special form of hook for the same object.

For hæmostasis of the broad ligaments, Olshausen employs the elastic ligature, making an opening in the peritoneum with a blunt

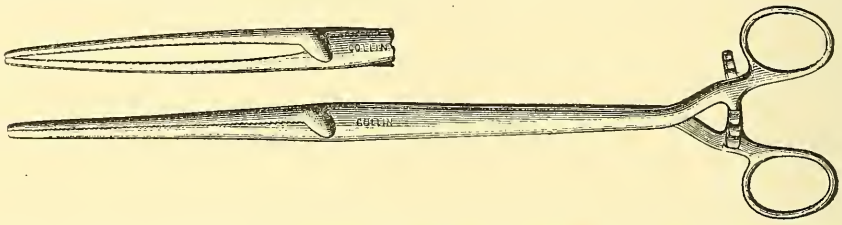


Fig. 187.—Bowed Forceps for Compression of the Broad Ligaments in Vaginal Hysterectomy (Doyen).

bistoury and passing the elastic band with a Deschamps [Peaslee's] needle. Hegar and Kaltenbach[35] also recommend provisional elastic ligature of the ligaments in mass, securing permanent hæmostasis by partial silk ligatures as soon as the uterus is detached. This I consider a useless complication. C. E. Jennings[36] has made a provisional ligature of the ligaments in mass with a loop of carbolized silk, fastened with the aid of a perforated shot which is crushed; he then uses either ligatures or permanent forceps.

Péan applies forceps to the ligaments. Richelot[37] generally employs permanent forceps in all cases. Various forms of forceps have been proposed; long ones by Spencer Wells; curved on the side by Péan-Richelot (Fig. 50); a disjointable form by Doléris; Doyen's model (Fig. 187), a kind which is curved so that they compress only with their points; Polk's clamps, etc.[38] A great number of surgeons, especially in France, have adopted this operative procedure, which is objectionable for many reasons, of which the chief are: the absence

of secure hæmostasis, possible injury to the bladder, ureter, or intestine [greater risk of intestinal adhesion], and finally the obstacle which it presents to complete antisepsis.[39]

Modifications of the Fifth Step.—With the object of preventing recurrence by free excision of the adjacent tissues, it has been proposed to terminate the hysterectomy by cutting away a part of the vagina or of the broad ligaments. Richelot[40] advises the first, even when the vaginal wall is healthy, as a complementary step which is easily executed at the end of the operation. Pawlik[41] still more

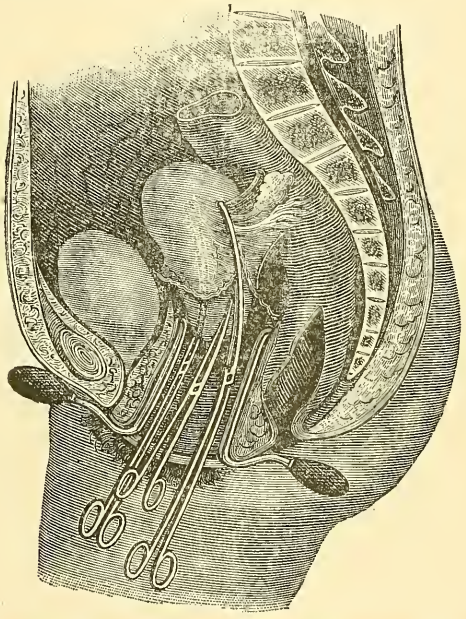


FIG. 188.—VAGINAL HYSTERECTOMY. Application of forceps and section of the base of the broad ligament (Péan).

boldly extirpates the parametrium, after placing sounds in the ureters so that they may be recognized and avoided; he has operated three times in this manner, but his final results are not published. It is doubtful whether these modifications are really useful, and it is certain that they are more or less dangerous.

The question of drainage is not definitely settled. In France the majority of operators leave the wound open and introduce one or two rubber tubes. In England glass tubes are more used. Martin employs a rubber tube made in the form of a cross, which has the advantage of being easily retained in place, and removes it on the third or fourth day. But in Germany most surgeons close the peritoneal

wound; Kaltenbach, Mickulicz, Tauffer, v. Teuffel, Schede, etc., declare in favor of this method, while Czerny and Fritsch reject the suture. I think with Demons, Bouilly, Terrier, and almost all French surgeons that it is more prudent not to close the wound completely, but to diminish it. The discharge of serum and blood which is so frequent in the first few hours shows that this is not an unnecessary precaution, for in spite of all our care the wound may be infected with cancerous material.

Decortication of the uterus, the old method of Langenbeck, who operated thus on a prolapsed uterus in 1813, has been revived by cer-

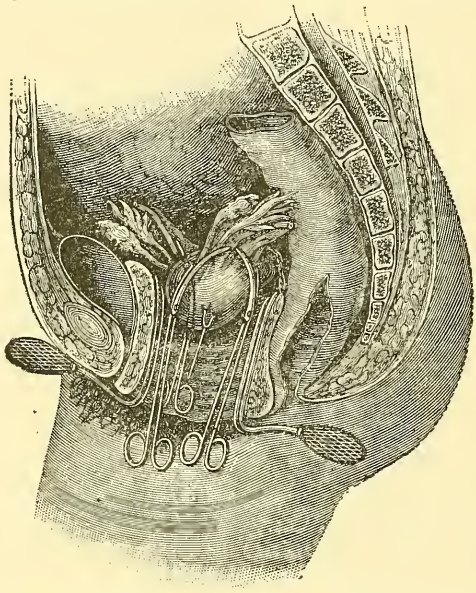


Fig. 189.—Vaginal Hysterectomy. Forcipressure of the superior border of the broad ligament after inversion of the uterus (Péan).

tain authors, among whom are Lane[42] and Frank.[43] It is only a useless complication.

Operative Accidents.—I have already spoken of hemorrhage and the means of avoiding it.

The ureter may be wounded by the bistoury, a ligature, or the grasp of a forceps; it is also in great danger from forcipressure. As it has been included in the forceps of very distinguished operators, it is evidently the method and not the operator which should be blamed;[44] when the accident is not mortal, it usually ends in the establishment of a ureteral fistula.

To avoid such injury to the ureter we must keep very near to the

cervix, the uterus should not be inverted until it is freed from its attachments up to the peritoneum, and, lastly, no long forceps should be deeply placed on the broad ligament.[45]

The bladder has been opened by the bistoury and torn through by the finger, the accident being almost unavoidable if the operation is performed for cancer with large extension anteriorly (which should contra-indicate any operation). We must never forget to catheterize the patient at the beginning of the operation and so make certain that the bladder is empty and least liable to injury.

When the bladder has been cut or torn, it must be immediately closed with sutures. Such cases have recovered without fistula, and, if not, they are easily treated later. In every case a soft catheter is to be retained in the bladder for several days.

The rectum should not be opened except by an actual fault of the operator, unless it is invaded by the disease, in which case the radical operation would be more injurious than useful. It has been wounded by the forceps, both by being seized in their jaws and from simple pressure effects.[46]

Mortality.—The mortality has fallen considerably during the last few years. In 1884 F. Brunner[47] collected in his inaugural dissertation all the cases then published and found, before 1877, 33 cases with 82% of deaths, and, after 1877 till February, 1884, 146 cases with 32.9%, of deaths. Mundé,[48] in 255 cases from both continents since 1879 (the time when Czerny made known his operation) up to 1884, found 72 deaths, or 28%. W. A. Duncan,[49] in 276 cases since the beginning of 1885, found 28.6%; and Hache,[50] who used the excellent tables of S. Post[51] with good effect, and added other cases, bringing the record up to the beginning of 1887, gives for this period a mortality of 24.47%.

These figures have only a historical interest, for, in order to appreciate the gravity of colpohysterectomy, we must eliminate the older cases and confine ourselves to those of later years, where the technique was perfected and the operators had acquired a large experience. It is just, also, in an exact estimate, not to include isolated cases by surgeons more or less incompetent. In the statistics of Duncan (1885) there were 276 cases of seventy-one operators, and thirty-five of these surgeons had performed the operation but a single time. With such elements we are likely to obtain the inherent mortality of the operators and not of the operation. The rule established by Tait seems reasonable; it consists in adopting as the criterion the results of surgeons of average ability and experience, and thus all new operations should be judged.

Following this rule, Martin[52] obtained the list given below of operations up to the end of 1886:

Fritsch	60	operations with	7	deaths,	10.1%
Leopold	42	" "	4	"	9%
Olshausen	47	" "	12	"	
Schröder and Hofmeier	74	" "	12	"	
Staude	22	" "	1	"	
A. Martin	66	" "	11	"	
	311		47	about	15%

But, as I have said above, these results, though recent, are still too ancient for our purpose. The latest statistics which I have examined give 5% as about the correct mortality; the last series of 80 operations which Leopold had gave 4 deaths, or 5%;[53] Kaltenbach, in 53 cases, had 2 deaths, or 4%;[54] D. de Ott is still more fortunate, having operated thirty times without a single death;[55] and the same is true of 25 consecutive cases of Péan's which were successful.[56] After these figures, there is no need, it seems to me, of further discussion as to whether this operation is applicable to every case where cancer has been diagnosed. It cannot be denied that we may thus perform a radical operation; why, therefore, should it not be adopted, since it is as benign as the partial operation? Consequently there is to-day, on the part of many surgeons, a reaction against amputations of the cervix in cancer: Schatz, Gusserow, Martin, Kaltenbach, Sänger, Fritsch, C. Fenger, Bouilly, Terrier, etc., have thus expressed themselves categorically. I also believe that hysterectomy is the operation of election when the diagnosis of cancer is certain. Therefore I have written[57] (without always having been understood[58]), "the more limited the disease, the more extensive should be the operation." In thus removing the whole of the uterus, the result is certain, there is no opportunity for the disease to recur locally, and we avoid also ganglionic engorgement and invasion of the adjacent tissues, both of which have occurred where the treatment has been palliative and only partial destruction attempted. In other words, we simply apply here the rules which are accepted for external or general cancer.

Causes of Death after Vaginal Hysterectomy.—These may be arranged under three principal heads—hemorrhage, shock, and septicæmia.

Hemorrhage may occur during or after operation. Primary hemorrhage is always the result of an operative fault, and may be certainly avoided by ligating the tissues step by step in small portions before they are divided. We should also avoid any traction upon a

ligature when it is once tied, and for this reason the ends of the thread should always be cut at first, instead of saving them until the end of the operation. Progressive ligature exposes less to risk of hemorrhage than the use of forceps. If a ligature slips, but one or two vessels bleed. If the tissues become disengaged from a long forceps, the greater part, if not the whole, of the broad ligament retracts and gives rise to free hemorrhage. There are many cases of death after the systematic use of forceps from this cause, of which I will cite only that of Richelot[59] occurring in the service of Professor Verneuil, and one other in my own practice which I have not yet published.

Secondary or rather continuous hemorrhage has been observed in cases of excision for cancer where the parts adjacent to the uterus were involved and all of the disease could not be removed.[60]

In case of secondary bleeding, which is a comparatively rare accident, the vagina should be packed with tampons of resin-iodoform gauze if the hemorrhage is not alarming. If, however, it is dangerously free, the bleeding vessel should be found and tied or controlled with forceps (forcipressure of necessity).

Shock.—Under this vague and general name are grouped factors the most diverse. In the first place, exhaustion from a hemorrhage whose importance has escaped the attention of the operator may be one of the causes of the accident, for, unless the hæmostasis has been carefully performed step by step, certain vessels may bleed continuously during the whole of the operation, and this condition is the more serious when the patient has been already exhausted, or when it continues for a long time.

Another cause of shock is acute uræmia, depending upon alteration of the kidneys. It is well known how frequently compression of the ureters causes disease of these organs. Many cancerous patients live with the minimum of uropoietic function in a kind of unstable equilibrium, and, if this precarious condition is overbalanced by some disturbance, the uræmia which has been threatening develops with great rapidity. Thus the chloroform [or especially ether] absorbed during the time of anæsthesia may during its elimination by the kidney cause a fatal congestion of these organs; hence the mortality of prolonged narcosis. The uræmia may be due to absorption of the wound secretions, whose elimination encumbers the renal filter and monopolizes the small portion of healthy tissue which sufficed for the normal requirements of the economy. Many cases of death from so-called shock are plainly due to uræmia, generally of the comatose form, as appears both from

the clinical details and from the autopsy records. It may also have been caused by the unfortunate application of a ligature to an unrecognized ureter. To avoid such accidents, we should never perform hysterectomy on a patient who presents symptoms of albuminuria or whose urine contains a largely diminished quantity of solids. If, however, in spite of unfavorable conditions, we decide to operate, the gravity of the prognosis should be recognized and the operation be performed as quickly as possible with the shortest convenient duration of the anæsthesia. I keep my patients on a milk diet for the first few days after the operation, quite as much to facilitate diuresis as to supply aliment.

Septicæmia.—One of the chief causes of this accident is the infection of the wound in its deeper portions by either the fluids or the débris of the cancer. This condition may be escaped by following the rules which I have described and advised—preliminary curetting, scraping the fungous portions, continuous irrigation during the operation, preservation of a protective barrier between the reversed cervix and the peritoneal cavity, extraction of the uterus entire without morcellation, rejection of permanent forceps which cause mortification of the tissues, and rigorous antisepsis.

Survival after Hysterectomy.—Although the operation is of very recent date, a number of reports have been collected upon the subject, the most extensive of which is that furnished by Hache.[61] A résumé is given in the following table, which I cannot reproduce without remarking that it unfortunately refers to a series of relatively ancient cases of operation where it was performed too late, with no real chance of permanent success. It gives, therefore, too gloomy an idea of the actual results, but it is a valuable document by which to appreciate the progress accomplished since 1866.

ULTIMATE RESULT IN 150 CASES AFTER HYSTERECTOMY.

Time since operation.	Lost to view before recurrence.	Dead, or with return.	With no recurrence.
3 months	5	23	122
6 "	6	20	96
9 "	5	10	81
12 "	2	9	70
18 "	10	8	52
2 years	14	0	38
3 "	21	0	17
4 "	10	1	6

By these figures we may appreciate approximately the proportion of survivals and recurrences in one hundred operations during what

may be called the initial period of hysterectomy (up to 1886). To determine this proportion, it is necessary, as Hache asserts, to consider all patients lost to view less than a year after operation as having had a return of the disease immediately after their last examination. For those which were observed more than a year, Hache includes among recurrences a majority of those who have been consequently lost to view. The following results, therefore, may be considered a very pessimistic interpretation of the preceding statistics:

In 100 Cases.—Twenty-three succumbed to operation; in 15 the disease returned in the first three months; in 13 between three and six months—which is 28 in the first half year; in 13 between six and twelve months, that is, 13 in the second semester; in 10 between one and two years; in 10 in the second year; 26 were still in good health at the end of two years.

In determining what per cent of the patients had a recurrence in the number of those who survived at the end of each of these periods, Hache found that the chances of return were about equal during the first two periods of nine months, with a gradual decrease thereafter. This result is evidently due to incomplete operation and the immediate return of a neoplasm which has been simply resected. There is still another factor, which is the very rapid course of certain cancers, especially in young women. As a striking example of this, two patients of Tillaux and one of Tédenat had a return of the disease at the end of six weeks, three months, and five months. I have observed a case of rapid return in a woman of thirty-eight years with a tubular epithelioma of the cervical cavity; the origin of the disease seemed to have been only five months before the operation, and, although the diseased portions were entirely removed, the return was very rapid, and the patient succumbed five months after the hysterectomy.[62]

A valuable report is given by A. Martin in the memoir which I have cited. In the series which he reports is included the practice of certain German gynæcologists up to the end of 1886, with the following results as regards survival without return:

Recurrence.	Leopold, 56 cases.	Schröder, 62 cases.	Fritsch, 53 cases.	Martin, 56 cases.
In 1 year	16	20	17	35
In 1½ years	9	10	..	32
In 2 "	5	7	7	25
In 3 "	3	4	2	20
In 4 "	..	..	..	5
In 5 "	..	..	..	3
In 6 "	..	..	..	2

Percentages derived from the above table:

Recurrence at end of 1 year.	42.3%
" " " 1½ years.....	32.9%
" " " 2 "	21.15%
" " " 3 "	13.41%
" " " 4 "	2.4%

The operations performed in France are of too recent a date for us to establish an analytical table. Bouilly, in 29 cases, had 23 cures, of which one had had no return after two years, one after fourteen months, and one after five months and a half; 13 cases of return have been observed less than a year after operation. Richelot, in 24 cases, had 15 cures, among which were eight rapid returns, one cure after twenty-five months, one after twenty-three months, one after eighteen months, one after fourteen months; the others have not yet lasted a year. In my own series of seven cases, I have had one cure lasting two years and a half, and one case after one year and a half enjoyed perfect safety; twice there has been rapid return within the year. The most important series which has been recently published is that of Leopold,[63] relating to 80 vaginal hysterectomies for cancer, in which only 4 died after operation, and comprising the results of his practice during five years and half. Among the 76 cures, 14 have since died, among which only 10 were due to return of the cancer and 4 to other causes; in the 62 surviving patients, only 3 presented a return; the others remained cured for a variable time. It is seen also that 27 cases remained free from return two years or more among 80 operations; but subtracting the 4 deaths from accidental diseases, we have the figure 76 as the more exact number.

Hofmeier, taking the end of the second year to establish the value of total extirpation, according to Schröder's operations, obtained the figure 24% as representing the proportion of complete cures, but, as return of the disease is always to be feared, it is an illusion, I think, to speak of definite cure of cancer of the uterus more than in the case of any other malignant neoplasm. It is not the less correct to perform hysterectomy just as we practise amputation of the breast and dissection of the axilla, of which the prognosis is certainly more grave; a return is always to be feared in either case, but a temporary respite is still a benefit.

It is interesting to examine the reports of survival after partial operation (supra- and intra-vaginal), and to compare them with those of total ablation of the uterus. But before reporting on the principal

documents which we possess on the subject I must remark that this unequal parallel should not be made the basis of conclusions without some reservation. In what cases do we always amputate the cervix? For cancer at its beginning. In what cases do we ordinarily perform hysterectomy? For cancers which are well advanced, having already reached the body of the organ. In the first case, there are many chances that the disease has not infected the lymphatics, but very few in the second. Why should we then be surprised if return is less rapid where amputation of the cervix has been so fortunate as to remove all of the disease? But who shall say that all the cases of permanent cure would not have been increased in number if those treated by partial operation had been submitted to total ablation of the organ?[64] May not those cases be unrecognized where, with appearance of the disease limited to the cervix, the mucous membrane of the body is invaded by propagation, and also those where the uterine parenchyma contains distant secondary nodules?

The comparison which we would like to establish between the results of partial and total ablation, as regards permanence of cure, would not be a just one unless it were derived from two series of patients in exactly similar conditions, with affections of equal development. But how shall we construct such a parallel with the aid of published series of total hysterectomies which refer in the great majority of cases to disease which has passed freely beyond the cervix, which appear in the list of the less serious cases, and yet which render the final table discouraging? For this reason I have thought that the value of the actual statistics on this special point should be contested.[65]

The most important papers on the subject are those of Schröder-Hofmeier and of Verneuil.

The first in date, and not the least curious,[66] is the former, which gives all the total hysterectomies and partial amputations of Schröder's clinic from 1878 to 1886. The following table gives the comparative number permanently cured by the two methods:

At the end of 1st year,	Partial operation, 114 cases.	49 cures.....	51%
	Total hysterectomy, 46 cases,	20 cures.....	63.6%
" " 2d "	Partial operation, 102 cases,	38 cures	46%
	Total hysterectomy, 40 cases,	7 cures.....	24%
" " 3d "	Partial operation, 76 cases,	24 cures	42%
	Total hysterectomy, 31 cases,	6 cures.....	26%
" " 4th "	Partial operation, 59 cases,	19 cures.....	41.3%
	Total hysterectomy, 18 cases,	0 cures.....	0%

It is evident that an enormous advantage lies with the second year after amputation (supra- and intra-vaginal taken together); at the end of three years 24 patients out of 76 had no return of the disease, and at the end of 4 years 19 out of 39: but may that not be due simply to the fact that they were operated upon before the lymphatics were infected?

The results of Verneuil are no less remarkable.[67] The intra-vaginal operation with the écraseur, in his hands, gave the following proportion of recurrence and periods of respite: In 21 operations there were 10 cases of rapid return; in more than 9 of these Verneuil recognized by immediate examination that the ablation had not been complete. In 6 other cases there was no return up to the time when the patient was lost to observation in perfect health, three years and more after the operation. Two cases, which are still alive but afflicted with a return in a distant part, presented an apparent recovery after three years. Lastly, in 3 cases, the patients were actually in good health after five years, seventeen months, and three months.

In contrast to this series, which appears to prove the therapeutic superiority of the partial operation, the results of Martin's experience should be cited.[68] A pupil of the school of Schröder, he began to perform supra-vaginal amputation of the cervix in cases of epithelioma where it was theoretically indicated, but his results were deplorable: Among twenty-eight patients, two alone remained without recurrence. He then adopted early hysterectomy, with decided improvement in his ultimate results.

In the presence of such contradictions, and the absence of rigorous means of comparison, I must persist in considering the value of these statistics as very slight, for the conclusion appears to me paradoxical that partial excision of the tissue about the neoplasm is as efficacious as ablation made as free as possible.

Recently, surgeons have devised several new methods of penetrating the lower pelvis. Otto Zuckerkandl[69] has proposed division of the recto-vaginal septum, making a transverse incision (Fig. 190) which will comprise all the space between the sciatic tuberosities, instead of being limited by the vaginal walls. Frommel[70] has adopted this procedure with success, and claims that it allows the surgeon to considerably exceed the usual bounds of hysterectomy. Sänger, on the contrary,[71] who performed the operation only on a cadaver, rejects it completely.

The para-sacral or para-rectal incision of E. Zuckerkandl[72] and

Wölfler [73] furnishes a method of hysterectomy for difficult cases. It consists of a deep incision, either on the left side (Zuckerkandl) or upon the right (Wölfler). The latter surgeon makes his incision from a little higher than the articulation of the sacrum with the coccyx, beginning from 1 to 2 cm. outside of that point and cutting downward with a slight external concavity which corresponds to the tuberosity

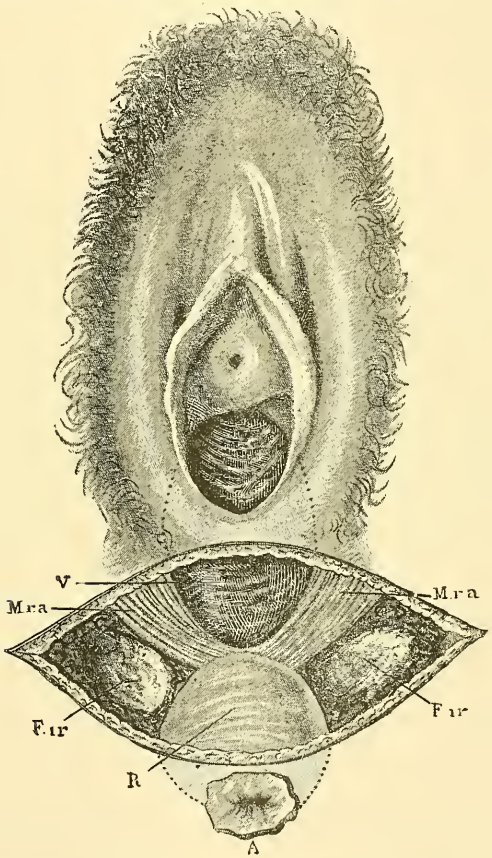


FIG. 190.—TRANSVERSE PERINEOTOMY, O. ZUCKERKANDL. *A*, Anus; *R*, Rectum; *V*, Vagina; *Mra*, Levator Ani muscle; *Fir*, Ischio-rectal fossa.

of the ischium, to a point 2 to 3 cm. from the fourchette. In this way the ischio-rectal fossa is opened from below; then a part of the gluteus maximus is resected (Wölfler then extirpates the coccyx, which E. Zuckerkandl preserves), the sacro-sciatic ligaments and the levator ani are incised, and the rectum detached from the vagina. The culs-de-sac of the latter canal are then incised, and the hysterectomy is performed according to the rules already given. The operation is terminated by

exact occlusion of peritoneum and vagina and drainage of the parasacral wound, which is partly closed by sutures. Wölfler has employed this method upon the living subject, for extirpation of the rectum and also the uterus, while E. Zuckerkandl has limited his researches to the cadaver.

It seems to me bolder and yet more rational to employ the preliminary operation devised by Kraske for reaching the cancerous rectum deeply within the pelvis. It consists not only in resection of the coccyx, as Verneuil and Kocher have done, but also of the

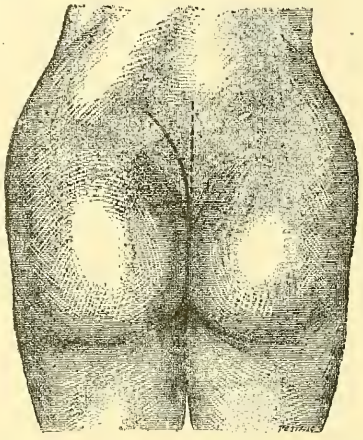


FIG. 191.—HYSTERECTOMY BY THE SACRAL METHOD. Line of incision. (The dotted line shows the central axis of the body.)

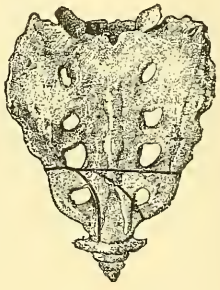


FIG. 192.—LINES OF RESECTION OF THE SACRUM.

lower wing of the sacrum, thus creating a very large opening where one can manœuvre with ease.

The patient is placed in right lateral decubitus, and starting from the point of the coccyx an incision is made by the side of that bone for about ten centimetres, curving outward to end at the middle of the sacro-iliac symphysis (Fig. 191). The coccyx is cleared of the periosteum and extirpated, and at the same time the lower portion of the sacrum is detached and removed with a strong cutting forceps, first laterally, and then, if necessary, by a transverse section. To procure space enough without injuring any important nervous branch it is sufficient to carry this section just below the third sacral foramen (Fig. 192). The rectum, which it is well to pack with iodoform gauze, is then displaced laterally, and the peritoneum incised in Douglas' pouch. An enormous opening is thus produced (ig. 193),

through which can be seen a large portion of the anterior abdominal wall between symphysis and umbilicus above the bladder.[74]

The first anatomical experiments in the application of this method of Kraske's to hysterectomy were made by C. A. Herzfeld, of Vienna,[75] but Hochenegg[76] recorded the first operations upon the living subject. One of these was by Gersuny, who was thus able to extirpate a very large uterus with a cancerous ganglion buried in the subperitoneal cellular tissue, the other was by Hochenegg himself, who removed both the uterus and a cyst of the ovary as large as the fist, which was adherent. Both cases recovered, but the second developed an intestinal fistula.

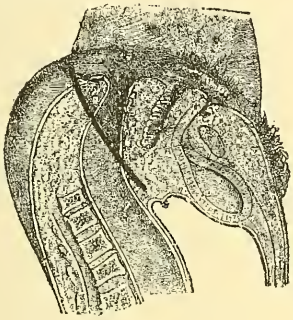


FIG. 193.—HYSTERECTOMY THROUGH THE SACRUM; OPENING OBTAINED BY PRELIMINARY OPERATION.

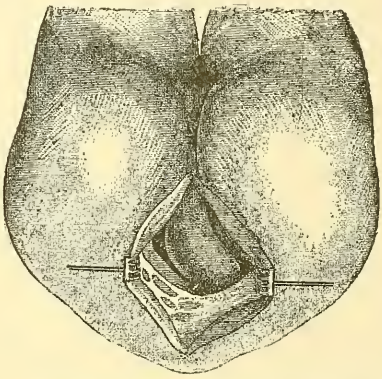


FIG. 194.—HYSTERECTOMY THROUGH THE SACRUM; CLOSURE AND DRAINAGE OF THE WOUND.

A modification of the preceding method was adopted almost at once by Hegar.[77] It consists in making only a temporary section of the coccyx and lower portion of the sacrum, and laying them to one side, without complete extirpation. When the hysterectomy has been performed, the flap containing the bone is returned to its place. Hegar had in one case a necrosis of the displaced bone, and in another it remained movable. Roux, of Lausanne, followed Hegar's example for the extirpation of a voluminous cancer which could not be removed through the vagina. In his second case, as the vagina was very narrow and there were reasons to fear adhesions between it and the bladder, Roux elevated the osteo-cutaneous flap as one opens a door, by transverse section of the sacrum with a cutting forceps, and sutured it for the time to the buttock. After ablation of the uterus the vagina was sutured, the flap replaced, and the wound tamponed with iodoform gauze and closed at its extremities. Both patients recovered.

Hochenegg advises not to proceed to detachment of the vaginal culs-de-sac until the peritoneal wound has been closed by sutures; in this way we avoid as completely as possible infection of the serous membrane by the tumor. With the same object, and to render the occlusion more complete, von Beck dissects a layer of peritoneum from the anterior face of the uterus.

Zinsmeister has described a certain difficulty in finding the peritoneal pouch at the bottom of the wound, but this seems to depend upon the fault, in the operation, of not carrying the incision far enough downward; it should be prolonged almost to the anus.

The relations of the rectum make it preferable to operate upon the left side, for then that organ is more readily seen, and consequently there is less risk of injury if it has been moderately filled with tampons. Rectal wounds, however, constitute one of the dangers of the operation, and require immediate suture (*suture à étage*). The ureter may also be cut; if that happens, it is made to empty into the rectum or the vagina. If into the latter, its lower portion is to be closed after establishing free communication with the bladder. This is better than establishing a urinary fistula through the wound.

After having carefully sutured the base of the wound itself, then the peritoneum (before extirpation of the uterus), then the vagina, (when the extirpation has been accomplished), the external wound is partly closed, leaving an opening large enough to permit drainage and antiseptic tamponing of its cavity—that is, of the "dead space" which always remains. The tampons should be left in place from six to eight days, then renewed and gradually decreased in quantity as the cavity fills up. It would be dangerous to make complete occlusion without some certain means of issue for the wound secretions.

There is no doubt that preliminary resection of the coccyx and sacrum greatly facilitates excision of cancer, which, without that, could be removed only through the abdomen. The facility of the manœuvres of extirpation and hæmostasis is also incomparable. We have thus a valuable resource in cases where the uterus is too voluminous or the vagina too narrow for the tumor to be accessible by the natural passages, yet this operative facility does not in any respect change the surgical limits which I have thought it well to assign to hysterectomy. Whenever the cancer has extended beyond the limits of the uterus, there should be no attempt at total extirpation.

IV. Cancer of the Cervix, with Suspicion or Certainty of Deep Extension.

When the mobility of the uterus is lessened, and bimanual palpation discloses a tumefaction and puffiness at the sides of the organ, two hypotheses are possible—perimetritis with adhesions, or extension of the cancer to the pelvic cellular tissue and broad ligaments. In the first case operation would be difficult and possibly dangerous, especially if there were purulent foci as in an unfortunate case of Le Bec;[78] in the second case it would be both dangerous and useless. It would be better to refrain from interference, however great may be the resources offered by the sacral method.

The operative prognosis is doubly aggravated in cancer with extension. Martin[79] had 32% of deaths in such cases instead of the 16.92% which he obtained in cancer limited to the cervix. The cases which increase the mortality of our statistics are very frequently of this kind. Removal of the uterus from the midst of a deep cancerous focus has been improperly described under the name of palliative hysterectomy,[80] just as the name of irregular supra-vaginal amputation[81] has been given to hysterectomy undertaken with no proper examination, and left incomplete after an exploratory dissection. This is an abuse of scientific language which is much to be regretted, for it seems to justify the operation where it is formally contra-indicated. An operation of this kind, when it does not kill the patient, which is often the case, is far less palliative than simple curetting followed by cauterization.

V. Cancer of the Cervix Invading the Vagina Primarily or Consecutively.

This invasion is an absolute contra-indication to any radical operation; for it is either an indication of the extension of an advanced cancer, which has probably already infected the lymphatics, or it is the result of the so-called vaginal form of cancer of the cervix, for which I have proposed the name "*liminaire*," and which has an invincible tendency to extend to the vagina and recur fatally in that situation. It is then rationally the whole of the vagina rather than the whole of the uterus which should be removed. Here the curette and cauterization are the best palliatives.

VI. Cancer of the Cervix Extending to Vagina and Bladder or Rectum.

In spite of advice to the contrary from distinguished surgeons,[82] to attempt a radical operation under these conditions, and for this purpose to remove the uterus and invaded portions of rectum or bladder, seems to me a fatal delusion. The operation certainly is feasible, but the recurrence, or, better, the immediate local multiplication, is fatal after a brief delay, for a cancer so far advanced has certainly infected the lymphatics. Moreover, the gravity of hysterectomy is much increased in such cases, and we may therefore demand whether it is well to expose the patient to dangers so great for benefits so precarious.

In the last three categories which I have passed in review I have described only a palliative operation capable of removing the two great causes of exhaustion of the patient, namely, the hemorrhage and the fetid discharge. For this purpose it is necessary to rapidly break down and remove the ulcerating masses which cause these symptoms. The best instrument for this is the curette, and beyond all others the cutting spoon of Simon (Fig. 195). With this instrument the largest mass of fungous growth may be rapidly removed; the smaller vegetations being followed into the crevices with smaller sizes of the curette. The position of the bladder and ureter must be noted beforehand and the greatest caution observed in extensive lesions. If we penetrate into the cavity of an invaded uterus we must, to avoid perforation, be careful to attack its surfaces obliquely and not perpendicularly.

As soon as the surfaces have been cleaned, Martin,[83] after freshening their edges, reunites them to produce primary union, though it seems to me that the cases which permit the application of this ingenious method are very rare and that it is very inconvenient. I much prefer to follow the curettage with the energetic application of the rose or olive shaped actual cautery, by which the neoplastic processes are followed up and destroyed in the midst of the healthy, more resistant tissue. This procedure is practically that which has given such good results in the hands of Kœrberlé and Baker, and which Schröder also recommends; I have obtained great benefit from it.[84]

This method of treatment may be repeated at intervals of a few weeks or months. If we operate rapidly, after application of cocaine

to the vagina, and under continuous cold irrigation, anæsthesia may be omitted, which is desirable, as the patients are usually much exhausted and have more or less advanced kidney lesions. The operation causes but little pain, and only the preparation for it is somewhat appalling.

After the curettage a tampon of iodoform gauze is placed in the

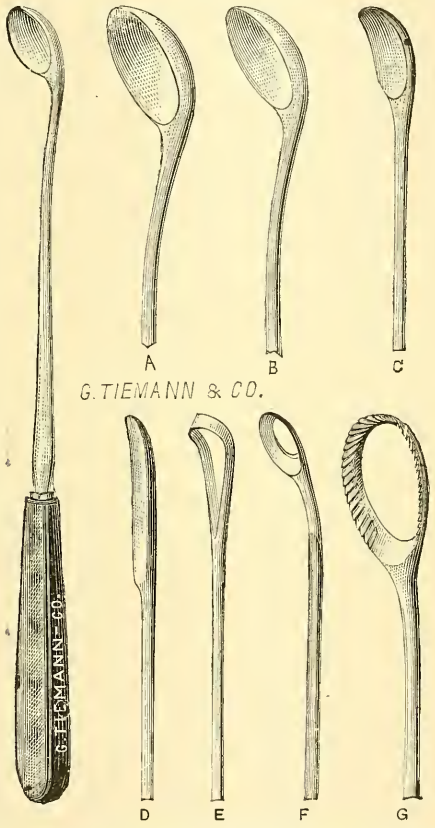


FIG. 195.—CUTTING CURETTES. *A*, *B*, and *C*, cutting spoons of Simon; *D*, Récamier's cutting curette; *E*, Sims' model; *F*, fenestrated curette with malleable handle. *G*, Thomas' serrated curette.

cavity produced by the excision, and renewed at the end of two days. Injections of sublimate 1:5,000, which appears to me the best, may also be employed. As soon as the granulations at the base of the vagina begin to secrete with some abundance I apply a small disc-shaped tampón wet with chloride of zinc (1:10), kept solidly in place and isolated by a large tampon of iodoform gauze saturated with bicarbonate of soda, the vagina being carefully tamponed with cotton so as to avoid any displacement. This dressing should be renewed

every second day, and each time preceded by abundant irrigation with sublimate.

Chemical Cauterization.—Various agents have been employed for this purpose, such as nitric or chromic acid, a 1:5 alcoholic solution of bromine, etc. The vagina must always be protected by tampons wet with a saturated solution of bicarbonate of soda. Canquoin paste has its ardent defenders, but numerous accidents, such as perforation, peritonitis, etc., due chiefly to the employment of caustic arrows, (flèches) have caused these to be almost entirely abandoned; chloride of zinc, however, managed with care, may render real service. The first to apply this caustic to the treatment of cancer of the cervix were Maisonneuve and Demarquay. Marion Sims, to whom many authors give the credit of the procedure, really came after them,[85] and Van de Warker imitated the latter in his special technique without citing him;[86] more recently, Fränkel[87] has recommended this agent again. Its application is as follows: The diseased surface is scraped with the curette, and the bleeding stopped with the cautery, though its action is not carried very far. Then a small tampon of cotton is placed on the cervix after being wet with a solution of chloride of zinc ($\frac{2}{3}$), and this is left in place from twelve to twenty-four hours. To neutralize the effects of this acid caustic on the vagina, Fränkel, following the example of Sims, superposes a tampon wet with bicarbonate of soda, and anoints the vulva with vaselin containing the same ($\frac{1}{3}$). The eschar is detached in about ten days.

[I have seen very satisfactory palliative results from the chloride of zinc used as follows: A sufficient number of very thin discs of cotton about one inch in diameter are soaked in a saturated solution of the zinc chloride, squeezed flat and dried. A number of larger tampons are prepared in the same manner from a saturated soda solution. The cancerous growth is rapidly and vigorously curetted until firm tissue is reached, when hemorrhage, until then profuse, usually ceases. The thin caustic discs are then carefully packed over the whole of the raw surface and the vagina carefully and firmly tamponed with the soda cotton. If the zinc cotton is used wet, it is difficult to prevent the caustic from running on to the vaginal walls and causing disagreeable sloughing. The slough caused by this treatment is deep and follows up the diseased tissue; it is dry and leathery and usually separates in from seven to ten days, leaving a very clean granulating surface.

The first tampons are to be removed on the second day, and the

parts dressed with iodoform gauze until the separation of the slough is completed.]

As an injection for disinfection in cases of very fetid discharge we may use a solution of permanganate of potash, about 10 to 20: 1,000 (a solution which should have a cherry-red color) or a dilute Labarraque's solution, and besides employ the curette followed by the cautery, or chloride of zinc, for destruction of the fungosities.

Against the hemorrhage, which will be diminished by the foregoing measures, we may apply tampons wet with perchloride of iron and then dried, after having dusted them with iodoform; but the hot iron energetically employed is the best means. Ergot is almost without effect, but something may be done with digitalis.

Erythema of the vulva may usually be prevented by extreme personal cleanliness, bathing with white wash (liq. plumbi subacetatis), and inunction of borated vaselin as a protection from the vaginal discharge.

Gastric symptoms are to be treated by tonics and bitters, such as wine of quinine, wine of colombo, bitter tincture (Baumé's) in doses of two or three drops before each meal, tincture of nux vomica in ten or fifteen drop doses in the same way, or amorphous quassin in pills of one centigram twice a day. If the kidneys are affected, milk diet should be ordered. Against repeated vomiting of uræmic origin, Winker has obtained good results from tincture of iodine in drop doses in water before each meal.

Constipation must be combated with great care, for the straining which it causes is a potent element in the production of the metrorrhagia. The best means of regulating the bowels is to give the patient a diet with plenty of vegetables and fruit, green peas, prunes, etc. A large enema every day, with the addition of two tablespoonfuls of glycerin, usually suffices so that we avoid the constant and injurious employment of purgatives, but, if necessary, the following may be given:

℞ Pulv. rhei, ... : gr. viiss.
Pulv. belladonnæ, ... gr. $\frac{1}{8}$.
M. ft. caps. No. 1.

If these measures are not successful, we must have recourse to drastic purgatives, of which the best is podophyllin:

℞ Podophyllin, ... gr. ss.
Ext. belladonnæ, ... gr. $\frac{1}{8}$.
M. ft. pil. No. 1.

The pains are seldom benefited by surgical interference, but frequent injections and dressings diminish them sensibly. Morphine by hypodermic injection could hardly be refused without cruelty to patients whose condition is hopeless. It is only necessary to enforce the limits within which it may be employed, and so avoid such abuse of the drug as would alter the digestive function and depress the bodily powers.

[In many cases the most satisfactory results in relieving pain are obtained by the employment of—

℞ Phenacetine, ... ʒ i.–ʒ iss.
Codeinæ, ... gr. vi.–gr. xij.
M. ft. chart. (vel caps.) No. vi.

Sig. One powder to be taken three times a day for pain.]

A tonic regimen should also be prescribed.

The following have been recommended as specifics: Hemlock, which merely aggravates the stomach disturbance; condurango in decoction (15 gm. to 200 gm. water), which acts only as a stomachic; and Chian turpentine (0.5 to 1.0 gm. in pill), which seems to have no injurious action, although its therapeutic value has not been demonstrated. [Methylene blue (pyoktanin), in two cases in which I have employed it locally, seemed to lessen the amount of hemorrhage, pain, and fetor, but had no perceptible effect in checking the progress of the disease.]

VII.—Cancer of the Cervix Complicating Pregnancy.

It is impossible to recognize a pregnancy, in a woman with cancer of the cervix, before the fourth month, for the volume of the uterus may be legitimately attributed to the presence of the neoplasm. If, however, the diagnosis should be made at that early period, ought the fact to modify the treatment? I think not. What we know of the accelerating influence of pregnancy on uterine cancer on the one hand, and the great probability of abortion on the other, make vaginal hysterectomy perfectly legitimate whenever it is applicable to the gravid uterus. For this operation the disease must be limited, and the volume of the uterus must permit extraction by the vagina. It is then remarkably easy on account of the laxity of the tissues,[88] and is infinitely preferable to intra- or supra-vaginal amputation of the cervix, which is a frequent cause of abortion and has often been followed by rapid recurrence.[89] [The primary mortality seems to be

even lessened by the presence of early pregnancy; fourteen cases, all successful, where the cancerous uterus with a pregnancy advanced from two to four months, has been removed by vaginal hysterectomy having already been recorded.[97]]

If the neoplasm has extended to the adjacent tissues we must distinguish between the very hard cervix, when abortion should be induced and followed by palliative treatment of the cancer (curette and cauterization), and the fungous cervix, all of whose circumference is not invaded, when it is best to wait and not induce abortion until feebleness of the fœtal heart renders it probable that its death is imminent.

When the labor is difficult, we should employ, according to circumstances, version or the forceps, and as a final resource the Cæsarean operation, for it seems to me that we should not sacrifice by craniotomy the living child of a mother who is beyond hope.[90]

Finally we must consider the rare cases where the cancer is still limited, but the uterus is too far developed for extraction by the vagina without evacuation of its contents. It is impossible to give rules which shall apply to all cases; the study of each patient must be the surgeon's guide. The following operations may be adopted, according to the special conditions of each case:

A. Induced labor, with hysterectomy after a few days.[91]

B. Cæsarean operation, with colpo-hysterectomy later.[92]

C. Total extirpation of the gravid uterus, with dissection of the vagina, by laparatomy, according to the procedure adopted for the first time with full success by Spencer Wells on October 21st, 1881.[93]

D. Hysterectomy by the sacral method, after resection of the coccyx and a part of the sacrum if necessary.

VIII. Cancer of the Cervix Complicating Fibroma.

If the fibrous tumor is large enough to form an absolute obstacle to the accomplishment of vaginal hysterectomy, there is only the choice between the abdominal operation of Freund, extirpation through the pelvis (sacral), and curetting followed by cauterization. One or the other of these last two is the method which I should adopt, for the dangers of abdominal hysterectomy are very serious in such cases. If, on the other hand, the fibroma is of small size, we may perform vaginal hysterectomy. I have done this without very great difficulty[94] in one case where there was a subperitoneal fibroma of the size of the fist.

IX. Cancer of the Cervix, with Complicating Cyst of the Ovary.

Should hysterectomy be performed, if it is legitimate, before the ovariotomy or after it, or both in one session? I consider that the affection whose course is the more menacing should be first treated, namely, the cancer. If the radical operation is justifiable, we should first perform total extirpation by the vagina and after recovery proceed to the ovariotomy; if, on the contrary, palliative treatment of the cancer alone is possible on account of its extension, we should not attempt ovariotomy as the patient will survive but a very short time. Asch [95] records a case where he performed total extirpation of the cancerous uterus and ovariotomy at the same time. The uterus was first removed by the vagina, then the cyst by laparatomy. In beginning the second operation, bubbles of air were noticed in the peritoneum, evidently introduced by the vaginal opening. On the eighth day, after removal of the sutures, there was gaping of the wound, and escape of the intestines, which displaced the bandage and rested on the thighs for two hours. These loops of intestine were cleansed with carbolic compresses and returned to the abdomen and a second suture made. The patient recovered. It is difficult to think that this serious accident could have occurred if the operation had been performed in two sessions.

I have observed one curious case of suppuration and cure by spontaneous evacuation of an ovarian cyst after colpo-hysterectomy. I had resolved to follow my first operation by ovariotomy, when, without great increase in temperature, there was a purulent discharge from the vagina on the fifteenth day, the cystic tumor disappeared, and soon after the patient made a complete recovery.[96]

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4. This opinion which I advocated in 1888, now finds a growing number of partisans. See Landau: Samml. klin. Vortr., No. 338, and Ott: Ann. de Gynéc., October, 1889, page 26.
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8. E. Van de Warker: Amer. Jour. Obst., 1884, p. 225.
9. Schröder: Zeit. f. Geb. und Gyn., iii., p. 419, and vi., p. 213.

10. Hofmeier: Berliner klin. Woch., Nos. 6 and 7, 1886. As to final results: in 7 cases there was no information; 43 had a return of the disease within a year, 45 had none; among 83 followed more than two years, 8 died, 7 were lost to view, and among 37 there were 31 cures, or 46 per cent.; of 49 after three years, 4 died, 6 lost to view, 26 with a recurrence, 23 cured, or 47 per cent.

11. Gusserow: Die Neubild. d. Uter. Eight deaths in 33 cases, or 9 per cent.

12. W. H. Baker: Amer. Jour. Obstet., 1882, p. 265, and 1886, p. 484, reports 10 cases without a death, 2 recurred after a few months, 1 cure after two years and then return, 1 cure of four years, 1 of four years and seven months, 1 of five years, 1 of five years and three months, 2 of six years, and 1 of eight years and then return. Reamy: Amer. Jour. Obst., 1888, p. 1,028, 57 high amputations, with 2 deaths from operation; return in 29 from one to fourteen years; 26 remained cured from one to fifteen years.

13. Wells: British Med. Jour., December, 1888; 1 death in 6 cases. Wallace, same journal, September 15th, 1883; 10 cases, 2 deaths, 20 per cent.

14. Kœberlé: Gaz. Hebd., February 26th, 1886. He prefers high excision of the cervix, with energetic cauterization, to total hysterectomy.

15. Marchand: Bull. de la Soc. de Chir., Oct., 1888; 6 cases, 1 death, peritonitis.

16. Buffet: Gaz. des Hôp., 1886, cited by Barraud; 2 cases, 2 immediate successes.

17. Tédenat, cited by Barraud, loc. cit. (3), p. 74; 1 case, 1 cure. Combining the the results of these three surgeons we obtain: 9 cases, 1 death from operation, or 11.11 per cent; 2 lost to view, 2 with early return, 2 deaths at the end of 11 and 30 months, 2 cures after 3 and 4 years.

18. Barraud: Loc. cit. (3), p. 48, obtains the figure 5.88 per cent from a small series of 34 cases in 1888 operations of Péan, Bouilly, Terrier, an l Richelot.

19. Munchmeyer: Cent. f. Gyn., 1889, No. 31; in 160 vaginal hysterectomies for different diseases between 1883 and 1889, Leopold had a mortality of only 5.4 per cent.

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22. Ruge: Cent. f. Gyn., 1885, p. 376. Strosch: Ibid., 1888, No. 50. Fritsch: Arch. f. Gyn., 1887, Bd. ii., Hft. 3, p. 362. Terrier: Rev. de Chir., May, 1888. Abel: Berl. klin. Woch., 1889, No. 30.

23. For history see Rochard: Histoire de la Chirurgie Franç. au xix. Siècle, pp. 265–267. C. G. Hesse: Mémoire pour Servir à l'Hist. de l'Extirp. de l'Uter., Rev. Médic., 1827, vol. 2, p. 67. Velpeau: Nouveaux Eléments de Méd. Operat., Paris, 1839, t. iv., p. 426. Gomet: L'hysterec. Vagin. en France, Paris Thesis, 1886.

24. Among the predecessors of the surgeons of to-day it is just to cite Sauter of Constance, who performed the first vaginal extirpation of the non-prolapsed cancerous uterus in 1822 with one successful case; and Récamier, who in 1829 obtained a cure in his first operation. After these came multiplied reverses and the operation was abandoned until the era of antiseptic surgery. For the beginnings of this renaissance see Freund: Zur Totalextirpation des Uterus, Zeit. f. Geb. und Gyn., vi., 2. Czerny: Ueber Ausrottung des Gebärmutterkrebs, Wien. med. Wochen., 1879, Nos. 45, 49. Demons: Arch. Général. de Méd., 1883, t. ii., p. 257. J. Boeckel: Bull. de la Soc. de Chir., June, 1884.

25. A. Martin: Path. und Ther. der Frauenk., p. 368.

26. Krukenberg has published a case of death on the 7th day from torsion of a loop of intestines about a drain which penetrated the peritoneal cavity. Niederrhein. Gesell. in Bonn, Cent. f. Gyn., 1887, 37.

27. Hegar and Kaltenbach: Die operat. Gyn., 3d edit., 1886, p. 446.

28. In a case of W. Duncan's where the ovaries were not removed, there were

three attacks of very severe pain corresponding exactly to the menstrual epochs, an indubitable sign of ovulation and circumscribed peritonitis; in view of their final cessation the author supposed that cirrhosis of the ovaries had occurred. The same accident was observed in a case of W. MacCormac's, cited by Duncan, Trans. London Obst. Soc., vol. xxvii., p. 29. Schröder has also noticed pain at such times in certain rare cases.

29. Grammatikati: Cent. f. Gyn., 1889, No. 7. Glaevecke: Arch. f. Gyn., Bd. xxxv., Hft. 1.

30. Fritsch: Cent. für Gyn., 1883, No. 37.

31. Olshausen: Clin. Beiträg. z. Geb. u. Gyn., 1885.

32. Schatz: Arch. f. Gyn., xxi., Hft. 3. Uterus.

33. Brennecke: Zur Tech. d. vag. Extirp. Cent. f. Gyn., 1883, p. 763.

34. P. Müller: Ueber die Extirp. Uter. vag. Deutsch. med. Woch., 1881, Nos. 10 and 11. Cent. f. Gyn., 1882, No. 8.

35. Hegar and Kaltenbach: Operat. Gyn., 3d edit., p. 445.

36. C. H. Jennings: On Excision of the Entire Uterus for Cancer; Lecture at the Cancer Hospital, March 5th and 12th, 1886; Lancet, Nos. 15 and 16.

37. The first idea of applying long forceps as a procedure of choice and leaving them in position for two or three days, belongs to Spencer Wells (Ovar. and Uter. Tumors, London, 1882, p. 526) who described it in 1882. His pupil, Jennings, finding some difficulties, simplified his master's rules, which have been recently discussed anew by Duncan, Jan., 1885, before the Obstet. Soc. of London, who (Oct. 30th, 1885) applied the long forceps of Wells and allowed them to remain; cure; case published March, 1886. In Nov., 1885, Richelot, Bull. de la Soc. de Chir., Nov., 1885, renewed before the Soc. de Chir. of Paris the theoretic proposal of Wells, and on April 28th, 1886, put his plan into execution, Commun. de l'Acad. de Méd., July 13th, 1886, Union Méd., July, 1886. Péan, who claimed priority in this practice and who was probably the first to use it in view of his great extension of the application of forceps to vessels, did not publish till 1886 in thesis by Gomet, De l'Hysterec. vag. en France, Paris Thesis. Buffet, of Elbueuf, Gaz. des Hôpit., 1886, No. 116, reports a case on June 19th, 1885, where Péan employed forcipressure as a necessity in a hysterectomy for myxo-sarcoma. The original point of Richelot's procedure is the systematic use of the forceps even when the application of a ligature is easy. On the priority of the use of forceps for the broad ligaments as questioned between Péan and Richelot, see Péan, Compt. rend. du Cong. Franç. de Chir., 1886, p. 388. Richelot: Nouv. Arch. d'Obst. et de Gyn., Oct. 25th, 1889, p. 449.

38. R. de Madec: Trait. chir. du Cancer de l'Uter., Paris Thesis, 1887. Doléris: Nouv. Pinces pour les Lig. larges; Bull. de la Soc. de Chir., March, 1887. Polk: Trans. of Obst. Soc. New York, Am. Jour. Obst., March, 1888, p. 302.

39. For the criticisms of this procedure see Demons: Cong. Franç. de Chir.; Compt. rend., 3me session, 1888. S. Pozzi: Ibid. and Indic. et Techn. de l'Hysterec. vag. pour Cancer. Annal. de Gyn., Aug., 1888.

40. Richelot: Bull. Soc. Chir., Dec. 29th, 1886, pp. 946 and 952.

41. Pawlik: Cent. f. Gyn., 1890, No. 1, p. 22.

42. Lane: San Francisco Pacific Med. and Surg. Jour., April, 1880.

43. Frank: Ueber extra-perit. Uterusextirp. Arch. f. Gyn., Bd. xxx., p. 1.

44. J. Boeckel: Bull. Soc. Chir. June, 1884. Richelot, cited by de Madec, loc. cit., p. 80. Lannelongue, cited by Demons, Cong. Fr. de Chir., 1888.

45. Certain authors, among whom are J. Boeckel, have treated a fistula after hysterectomy involving the ureter by nephrectomy; one could also, as Kaltenbach prefers, establish a free communication between the vagina and the bladder and then close the lower part of the vagina by the operation called kolpokleisis.

46. Duplouy, of Rochefort: Cong. Franç. de Chir., 1886. Küster, cited in Union Méd., March, 1886. Vrobleski: Union Méd., October 18th, 1888. A case of hysterectomy for a non-cancerous uterus.

47. P. Brunner: Ueber Extirp. des Uter. von der Scheide. Zürich Thesis, 1884.

48. Mundé: Gyn. Trans., 1884, vol. ix.

49. W. A. Duncan: Loc. cit. (28).

50. M. Hache: Rev. des Sciences Médic., 1887, p. 721.

51. Sara Post: Kolpohysterec. for Cancer. Am. Jour. Med. Sci., 1886, p. 113.

52. A. Martin: Trans. Internat. Med. Cong., Sept., 1887. Amer. Jour. Obst., Oct., 1887, p. 1,108.

53. Leopold, cited by Munchmeyer: Ueber die Endergeb., etc. Arch. f. Gyn., Bd. xxxvi., Heft No. 31.

54. Kaltenbach: Berl. klin. Woch., 1889, Nos. 18 and 19.

55. D. de Ott: Loc. cit. (20).

56. Péan, cited by Sécheyron: Trait. d'Hystér., 1889, p. 542.

57. S. Pozzi: Indicat. et Tech. de l'Hyst. Vag. pour Cancer. Ann. de Gyn., August, Sept., 1888.

58. M. Barraud: Loc. cit. (3), p. 6.

59. Richelot: Union Médic., April 3d, 1888.

60. Bouilly, cited by Hache: Loc. cit. (50).

61. Hache: Loc. cit. (50), page 127.

62. S. Pozzi: Ann. de Gyn., Sept., 1888, p. 192.

63. Munchmeyer: Arch. für Gyn., Bd. xxxviii., Heft 3, 1889.

64. D. de Ott remarks that from the point of view of survival it is necessary to divide the patients into two categories; those operated upon at the first of the disease, and those where the lesion is already far advanced. The first alone gives a survival of more than one year, and among these cases there has been one cure maintained for three and a half years and another for two years and one month. On the contrary, all patients operated upon too late are exposed to a return of the tumor in from one to eleven months.

65. S. Pozzi: Bull. Soc. Chir., 1888, p. 771.

66. Hofmeier: Zeit. f. Geb. und Gyn., Bd. xiii., Hft. 2, 1886. This work is not to be confounded with others by the same author upon this subject, which are less complete. Centr. f. Gyn., 1884, p. 284, and ibid., 1886, page 92, and Berliner klin. Woch., 1886, Nos. 6 and 7. The greatest differences exist between the statistics of these various publications, which has caused some confusion in citations made from them.

67. Verneuil: Bull. Soc. Chir., October, 1888.

68. Martin: Path. und Ther. der Frauenk., 2d ed., p. 309.

69. O. Zuckerkandl: Wien. med. Woch., 1888, Nos. 11 and 16; 1889, Nos. 12, 14, 15, 16, 18, and Wien. med. Presse, 1889, No. 7.

70. Frommel (Erlangen): Third Cong. of German Gynäk., Freiburg, 1889. Cent. f. Gyn., 1889, No. 31.

71. Sänger: Cent. f. Gyn., 1889, No. 31.

72. Zuckerkandl: Notizen über die Blosslegung der Beckenorgane. Wiener klin. Woch., 1880, No. 14.

73. Wölfler: Ueber den Para-sacralen und Para-rectalen Schnitt, etc. Wiener klin. Woch., 1889, No. 15.

74. Kraske: Verhandl. XIV. Cong. Deutsch. Gesell. f. Chir., 1885. G. Hochenegg: Die Sacrale Methode, etc. Arbeit. und Jahresb. der S. Chir. Univ. Klin. zu Wien, 1888, p. 13. Roux: De l'Accès des Org. Pelv. par la Voie Sacrée. Rev. Méd. de la Suisse Romande, 1889.

75. C. A. Herzfeld: Allg. Wien. med. Zeitschrift, 1888, No. 34.

76. J. Hochenegg: Die Sakr. Operat. in der Gyn. Wiener klin. Woch., 1889, No. 9. He had already suggested that the preliminary operation of Kraske could be applied to extirpation of the uterus and its adnexa in a memoir relative to extirpation of the rectum, published a little before Herzfeld's article. Wiener med. Woch., August, 1888, No. 19.

77. Hegar: Berlin. klin. Woch., 1889, No. 10. Wiedow: Centr. f. Gyn., 1889, No. 29. B. von Beck: Die Osteopl. Resec. des Kreuz., etc. Zeit. f. Geb. und Gyn., Bd. xviii., Heft 1, 1890, and Centr. für Gyn., 1890, p. 50. In four cases reported by von Beck there were two deaths, and two cures with rapid consolidation of the sacrum. Zinsmeister, ibidem, reports one case where there was a wound of the rectum and death in four hours. Hegar performed his first hysterectomy by the pelvic method in November, 1888, while Gersuny did his in December; but the latter was published first.

78. Le Bec: Hystér. Vag., double Pyosal., etc. Gaz. des Hôp., 1888.

79. Martin: Zur Statis. der Totalextirp. bei Carcin. Berlin. klin. Woch., No. 5, 1887.

80. Richelot, cited by De Madec: Trait. Chirurg. du Cancer de l'Utér. Paris Thesis, 1887, p. 90.

81. Richelot: Union Méd., 1888, p. 111. See my criticisms on this subject, Ann. de Gyn., August, 1888, vol. xxx., p. 92.

82. Mikulicz, cited by Schwartz: Rev. de Chir., 1882, expresses himself thus upon the point: "As long as one regarded the bladder and the rectum as a noli me tangere, just so long did extirpation of the uterus fail of desirable results; there must be no fear in attacking both rectum and bladder freely, for they are not organs essential to life." Terrier, cited by Gomet: Paris Thesis, 1886, is evidently inspired by these words when he says, "We should not hesitate to operate, since extirpation of a part of the rectum or of the bladder, which may be invaded, will not be incompatible with existence."

83. Martin: Path. und Ther. der Frauenk., pp. 99 and 100, and von Rabenau: Berlin. klin. Woch., 1883, No. 13.

84. Kœberlé: Gaz. Hebd., February 26th, 1886. W. H. Baker: Amer. Journal Obstet., 1882, p. 265, and 1886, p. 184. Schröder: Loc. cit. (1), p. 325. Despreaux: Du Curet. Utérin. Paris Thesis, 1887. A. Pozzi: Le Traitement du Cancer de l'Utér. Paris Thesis, 1888.

85. Marion Sims: Amer. Jour. Obstet., vol. xii., 1879.

86. Van de Warker: Ibid., vol. xvii., 1884.

87. Fränkel: Centr. f. Gyn., September, 1888, No. 37. See on this subject a discussion at the Berlin Soc. of Gyn., June 22d, 1888. Martin on this occasion condemned caustics from their blind and dangerous action.

88. Hofmeier: Presentation to the Berlin Gyn. Soc. of a gravid uterus in the second month, etc. Centr. f. Gyn., 1887, No. 13.

89. Hofmeier: Ueber Operat. am Schwang. Uter. Deutsche med. Woch., 1887, No. 19.

90. Consult on this special point, Barbulée: De la Conduite à Tenir dans le Canc. du Col de l'Utér. pendant la Gross., etc. Paris Thesis, 1884. Bar: Du Canc. utér. pendant la Gross., etc., Paris Thesis, 1886. Gusserow: Die Neubildung. des Uterus,1885, p. 251. Herman: Canc. of the Uter. Complic. Preg. London Obstet. Trans., vol. xx., p. 206. Hanks: Preg. Complic. by Uter. Tumors. Amer. Jour. Obst., March, 1888.

91. Berthod: Gaz. des Hôp., 1886, No. 46. Report of a case of Bouilly's followed by success for the mother; pregnancy at the sixth month.

92. Teuffel: Ein Fall von Kaiserschnitt, etc. Arch. f. Gyn., Bd. xxxvi., Heft 2, 1889. Extraction of a living child by Cæsarean section; death of the mother after

21 days from septic infection. Teuffel recommends that the operation be followed by the use of a large drain through the cervix when it is obstructed by the neoplasm, to avoid sepsis. Merkel: Münchener med. Woch., May 21st, 1889, also obtained a living infant, but the mother died on the seventh day.

93. Spencer Wells: Ovarian and Uterine Tumors, London, 1882, p. 518.
94. Bourges: Gaz. Méd. de Paris, July 7th, 1888.
95. Asch: Cent. für Gyn., 1887, No. 27.
96. S. Pozzi: Ann. de Gyn., Sept., 1888.
97. Mundé and Wells: Sajou's Annual, 1891.

CHAPTER XVI.

CANCER OF THE BODY OF THE UTERUS.

Adenoma of the Uterus.—There is, except among French authors, a certain amount of confusion regarding adenoma of the uterus. Some authors apply the name of typical or benign adenoma to what I have described as glandular endometritis in a preceding chapter, while atypical or malignant adenoma is the same as the first stages of

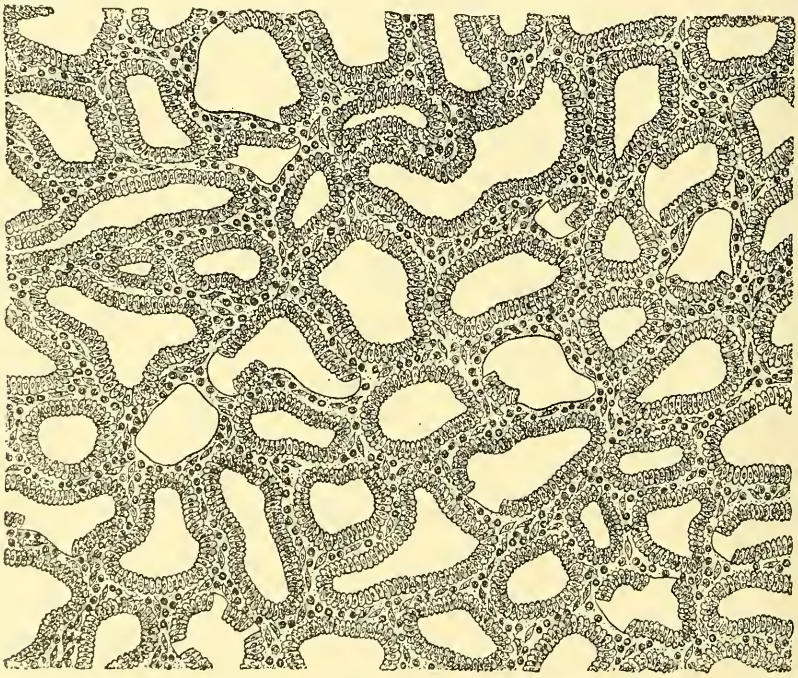

FIG. 196.—BENIGN ADENOMA OF THE UTERINE MUCOUS MEMBRANE. (Compare with Fig. 100, Glandular Endometritis), Wyder.

degeneration of the mucous membrane in epithelioma. This difference they derive from the anatomical conditions entirely, depending upon the distinctions and refinements of histology, while I, with all other French authorities, have adopted the nosology to the clinical aspect. The conception of adenoma plays no part at the bedside

of the patient. I refer to the chapter on Metritis for whatever concerns benign adenoma, having described its pathology with glandular metritis and its symptoms with catarrhal and hemorrhagic metrititis and mucous polypi.

Malignant adenoma is then only the initial stage of cancer of the mucous membrane. If there is any need of further distinction it may be described histologically as glandular epithelioma, adeno-carcinoma, or glandular carcinoma.[1]

It suffices to glance at the two following figures to see the enormous difference which separates these conditions, and to grasp at the same time the transitions which permit the transformation of the one into the other; for a lesion begun as a slight glandular endometritis may become, if inveterate, a glandular endometritis of the most pronounced type (typical benign adenoma), may then degenerate into an atypical malignant adenoma, and this is the first stage of cancer.[2]

In the case of the so-called benign adenoma (Fig. 196) the proliferation is absolutely typical, there are no solid epithelial tubes, and the cylindrical epithelium is in one layer only. Between the glandular tubes there is still a certain quantity of normal interglandular tissue. The glandular and the muscular layers are clearly defined, and the glands have no tendency to penetrate into the muscular parenchyma and destroy it.

In malignant adenoma (Fig. 197), on the contrary, the proliferation of the glands is atypical; furnished with a single layer of cylindrical epithelial cells, they are folded upon themselves and rolled up into glomeruli; the fibrous substratum has almost disappeared and the glands touch each other at many points; and there is no boundary between the glands and the uterine tissue.

The figure, borrowed from Ruge and Veit,[3] reproduces the initial lesions of cancer derived from malignant adenoma, forming thus the last stage which I have described in the pathological progression. The lumen of the glands is enlarged at the expense of the interglandular substance, the beautiful epithelium with vibratile cilia has changed its form and become stratified, flattened, and enlarged with an epidermoid aspect, following the greater or less rapidity of the proliferation, and the gland cells also stain with more difficulty. The space which the gland occupies by its increase may be fifty times that of its original volume. The epithelial proliferation may begin upon one of the walls and fill the cavity little by little, so that at last there remains but an insignificant portion still covered with a single layer

of epithelium; or it may start from the whole circumference of the gland at once and leave the cavity persisting. In other cases the glandular canal disappears so that there is only a solid mass of cells. Finally the proliferation of the cells may begin from many points at once and form by their junction a series of bridges which divide the cavity into several compartments. These glands, in part degenerated, form the last term between those which are still normal and those

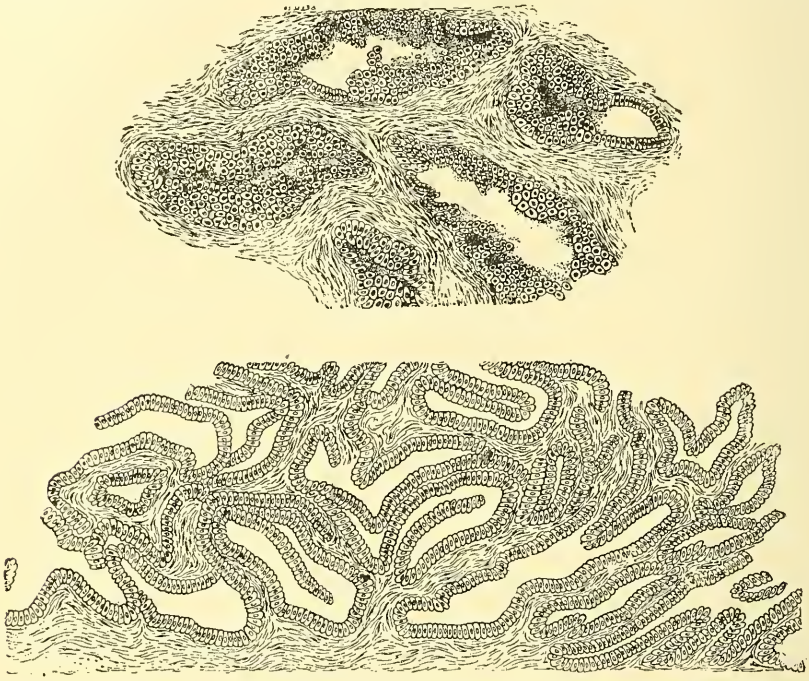

FIG. 197.—MALIGNANT ADENOMA OF THE UTERINE MUCOUS MEMBRANE. Beginning Glandular Epithelioma (Ruge and Veit).

which are transformed into solid cylinders, stuffed full of cancerous cells.

As regards symptoms, prognosis, and treatment, malignant adenoma is identical with cancer of the uterine body.

CANCER OF THE BODY OF THE UTERUS.

Cancer of the body of the uterus presents various anatomical forms which correspond to distinct clinical types, as follows:

1. Cancer of the mucous membrane:
   - *A.* Epithelioma (French authors).
     Carcinoma (German authors).
   - *B.* Sarcoma.

2. Cancer of the parenchyma (fibro-sarcoma, sarcomatous fibroma).

Primary cancer of the body of the uterus has until recently been regarded as very rare. Gallard found but two cases in his long career,[4] and Pichot[5] in 1876 could collect only forty-four cases among French and English authors.

This apparent rarity depends upon the fact that the older gynæcologists seldom employed exploratory dilatation, and almost never exploratory curettage. Thanks to the modern means of investigation we now know that primary cancer of the uterine mucous membrane is far more frequent than had been thought to be the case; thus Gusserow has published one hundred and twenty-two cases. The relative frequency of cancer of the body and of the cervix is, according to Szukitz,[6] in the proportion of 1 to 420. More recently, Schröder[7] in 812 cases found 28 of primary cancer of the body, and Schatz[8] among 80 cases found 2.

I. *Epithelioma or Carcinoma of the Mucous Membrane.*

The German school ordinarily applies the term carcinoma to the form which the French school[9] now designates as epithelioma. I shall consider these two terms, which suggest but one and the same lesion, as synonymous. One might almost describe this lesion as cancer of the menopause, in view of its great frequency at that epoch of the genital life. It originates in a transformation from the conditions of glandular metritis, such as I have described, which may be followed step by step in the same patient by repeated curettings.[10]

Pathology.—Macroscopically we may distinguish two varieties. In the one there is a diffuse growth of villi throughout the whole uterine cavity, which gives to its section the aspect of a ripe fig (Figs. 199 and 200); in the other there is an isolated fungoid growth with a large or small base, which at times has the form of a polyp (Fig. 198).

It is worthy of note that the neoplasm has little tendency to invade the mucous membrane of the cervix. This peculiarity is both an added difficulty in diagnosis and an advantage in the matter of treatment. The uterine wall, on the contrary, is little by little eroded and destroyed. Metastatic nodules form in various points of the parenchyma, and even under the peritoneum, causing protective adhesions of that membrane between the uterus, the bladder, and the intestines. Occasionally fatal peritonitis has been caused by perforation. Frequently these metastatic nodules are found superficially in the vagina and deeply in the ovaries, tubes, etc.

Histologically [11] these tumors are tubular or lobulated epitheliomata provided with tubes which for the most part are very large and form anastomoses with each other, with the peculiarity that the first layer of cells implanted upon the wall is regularly cylindrical. These cells are of long shape, and have nuclei which stain strongly. The successive layers are formed by polyhedral cells which are at times of the pavement variety. The most internal become mucous, cover the granulations, and often present complete atrophy of their nuclei.

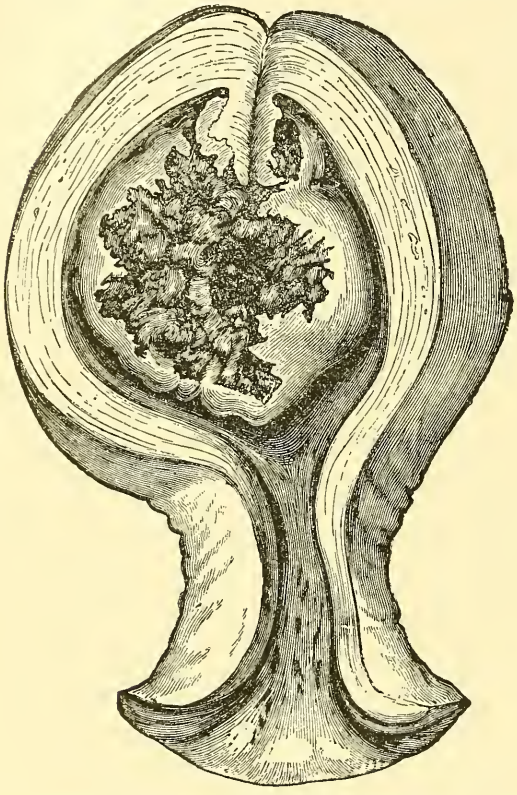

FIG. 198.—EPITHELIOMA OF THE UTERINE MUCOUS MEMBRANE, CIRCUMSCRIBED FORM.

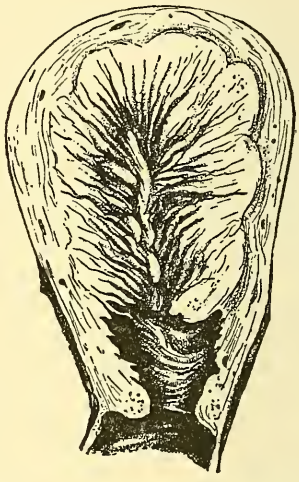

FIG. 199.—EPITHELIOMA OF THE UTERINE MUCOUS MEMBRANE, DIFFUSE FORM.

When a section is examined under a low power to obtain a comprehensive view of the neoplasm, a number of alveoli may be discerned, whose thin walls are carpeted by cylindrical epithelial cells in one or two layers only. In the fresh state, large cavities are also found which contain a mucous liquid holding cells in suspension (Fig. 201). It is easy to understand the method of formation of these cavities. The fibrous wall which circumscribes them contains capillary vessels penetrating into the epithelial layer, and covered by it. These vessels present vegetations under the form of papillæ which are seen sometimes cut longitudinally, sometimes transversely, in which lat-

ter case they appear to be surrounded by cylindrical cells. There are also mucous cavities in the midst of the epithelial investment, so that certain tubes, originally narrow, are transformed into large cavities.

With the higher powers the conditions are more easily understood (Figs. 202 and 203). Beside the lesions, which are wholly epitheliomatous, the alterations of chronic metritis are almost constantly found. To avoid errors many sections should be examined, and not merely a few small fragments.

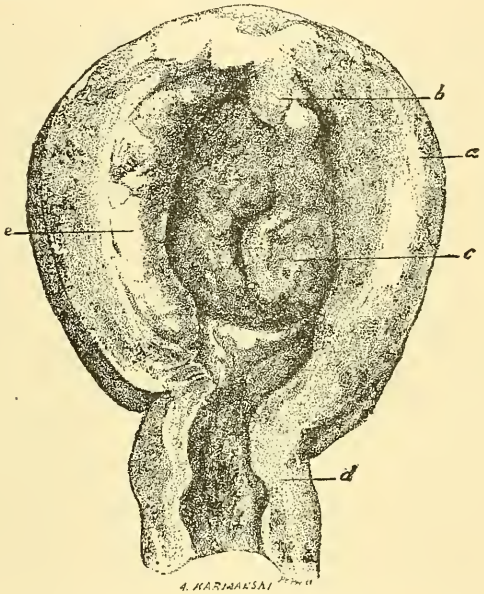

FIG. 200.—EPITHELIOMA OF THE UTERUS; DIFFUSE FORM, WITH CIRCUMSCRIBED THICKENING. *a*, Muscular wall of the uterus; *b*, *e*, section of neoplasm; *c*, surface of neoplasm; *d*, cervix, not involved.

The great quantity of cylindrical cells in these tubular or lobulated formations distinguishes these epitheliomata of the uterus from ordinary tubular pavement epitheliomata, such as are found in the integument. They are in reality a special form, peculiar to the mucous membrane where they are developed.

At an advanced stage of evolution, cancer of the body of the uterus may ulcerate, or, as Cornil has found, the mucous membrane may be preserved and merely elevated by the epithelial lobules.

The mucous membrane of the body of the uterus is usually easily recognized, for its epithelial cells are preserved although covered by certain wandering cells, but its glands are atrophied and their cylindrical cells are very small, the connective tissue being thin and com-

pressed. In other places the mucous membrane is reduced to a very thin layer of connective tissue lined by one simple layer of cylindrical cells (Fig. 204).

At a later period the muscular layers are infiltrated by the neoplasm, and there may also be extension to the tubes and ovaries.

I have described as a unique anatomical curiosity a case of primary pavement epithelioma of the body of the uterus, observed by O. Piering.[12]

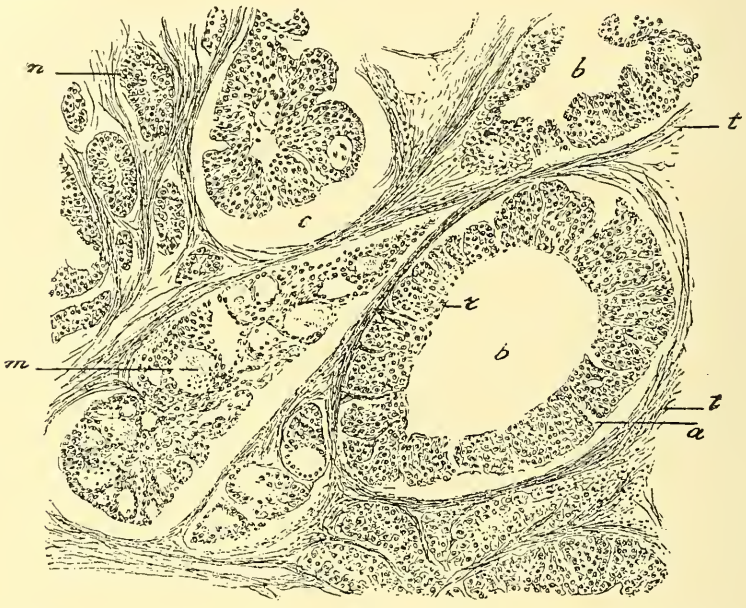

FIG. 201.—EPITHELIOMA OF THE UTERUS. × 120. *b*, *b*, Lobules of the epithelioma; *m*, lobules showing empty spaces, which are either transverse sections of vessels or cavities filled with cells in mucous degeneration; *n*, smaller alveoli of the epithelioma. Nearly all of these epithelial cells have a tendency toward isolation by the walls of the spaces that enclose them.

Symptoms.—Hemorrhage is the primary symptom, and, as in cancer of the cervix, it is usually accompanied by a serous discharge[13] of a reddish color and a stale, disagreeable odor; with this there is often a discharge of small shreds of tissue from the broken fungosities.

The pains and the other functional and reflex symptoms are, for a long time, those which I have described under the head of the uterine syndroma (*vide* metritis); but according as the disease becomes more advanced the pain takes on a paroxysmal character which is remarkable and almost pathognomonic. These crises of excruciating pain described by Simpson are wrongly attributed, I think, by Schröder to contractions of the uterus caused by the effort to expel

its abnormal contents. They have none of the characters of colic, and their appearance at regular hours once or twice a day, even after the tumor has been destroyed by the curette, as I have observed, proves clearly that they are due to a veritable neuritis propagated along the nerves of the disorganized uterus.

Bimanual palpation determines that the organ is much increased in volume, being as large at times as the pregnant uterus at the fourth month. It remains movable for a long time, but finally becomes

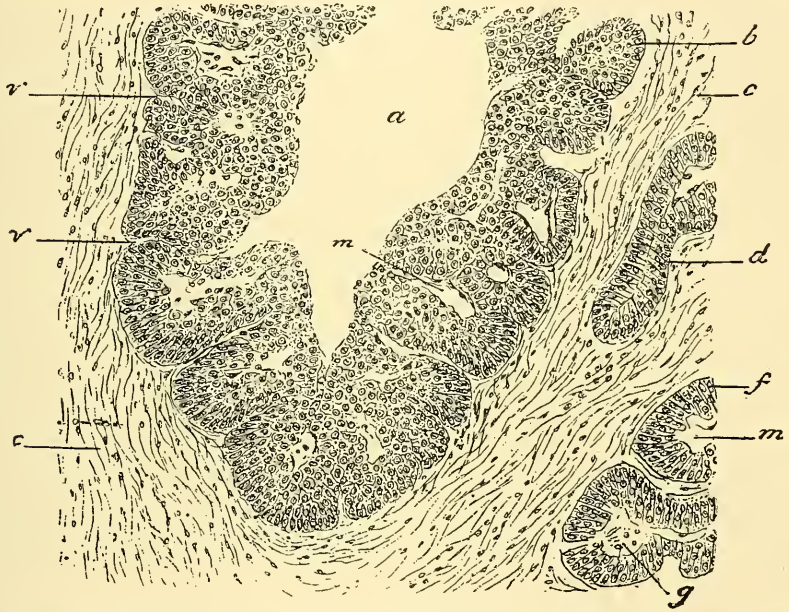

FIG. 202.—EPITHELIOMA OF THE BODY OF THE UTERUS. High power. *c*, Connective tissue; *d*, glandular cul-de-sac, but little altered; *f*, *g*, *m*, dilated and modified glands. Their investment is formed of cylindrical cells, *f*, but their cavity is full of cells, *m*, *g*, and the glandular membrane is wanting. *a*, Large cavity in the middle of an island of epithelioma. The epithelial mass is pierced by vessels which belong to the adjacent connective tissue, as seen at *v*, *v*, *m*, oblique sections of the same vessels (Cornil).

imprisoned by adhesions in the pelvis. By touch, the cervix is found to be free from the disease, but often much softened and partly open, as in the case of the gravid uterus.

The sound, which should be used with much precaution, reveals an increase in the capacity of the uterus, and the presence of irregular masses. At times the cervix may be sufficiently dilated for the finger to feel these fungosities within the uterus; if not, an artificial rapid dilatation will confirm the diagnosis.

The condition of the general health fails as the neoplasm develops and terminates in cachexia.

Diagnosis.—The hemorrhage, the serous discharge, the increase in the volume of the uterus, and the results of intra-uterine exploration constitute the clinical elements of the case, while the examination of portions removed by the curette clearly differentiates between cancer and metritis without malignant neoplasm, or between carcinoma and sarcoma.

It is in these cases, however, that we encounter the greatest difficulties in the differential diagnosis between cancer and metritis. With all the common rational signs, and especially persistent hemorrhage which has resisted the curette, we have only the resistance of the disease to therapeutic measures and the examination

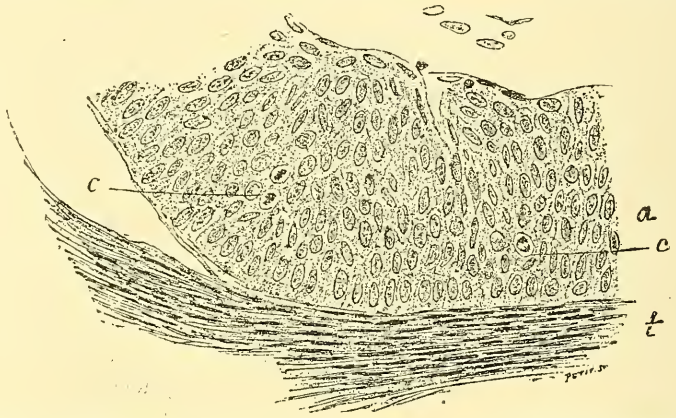

Fig. 203.—Primary Epithelioma of the Uterine Body. × 300. *a*, Numerous layers of stratified epithelium, the deepest being cylindrical; *e*, *e*, cells with karyokinesis; *t*, muscular tissue of the uterus, on which the cylindrical cells are directly implanted (Cornil).

of small particles removed by the curette to enable us to decide the nature of the lesion. As Cornil[14] has justly remarked, although histological diagnosis is easy when we have the whole uterus to examine, it is otherwise when we can secure only small fragments of the mucous membrane. The simple glandular hypertrophy of metritis may then be very difficult to distinguish from carcinoma, especially when the mucous membrane of the glands cannot be examined in the deeper parts. In the simple glandular hypertrophies there often exists between the culs-de-sac and the connective tissue a very regular layer of flat cells which serve as the membrane of implantation for the epithelium. The vibratile cilia are almost always preserved and are found to the bottom of the gland. The mucous transformation of the cells is never complete, but occupies only their free extremities. The interglandular tissue is less charged with lymph cells, but in the

epithelioma and the layers of young connective tissue they are arranged in regular lines which follow parallel to the excretory ducts. In the epitheliomata, on the contrary, there is at the same time a hypertrophic elongation of the glands and a multiplication of cells which rapidly lose the type of ciliated epithelium. As a result of this proliferation the lower part of the gland is filled full with an epithelial mass. The cells may either undergo a mucous transformation or take on the polyhedral or cuboid form. As soon as the walls of these glands are ruptured, the tumor presents the general disposition of epithelioma or carcinoma.

It may happen then, that as a last resort against the persistent hemorrhage which threatens the life of the patient, we are obliged to perform vaginal hysterectomy with only a diagnosis of probable

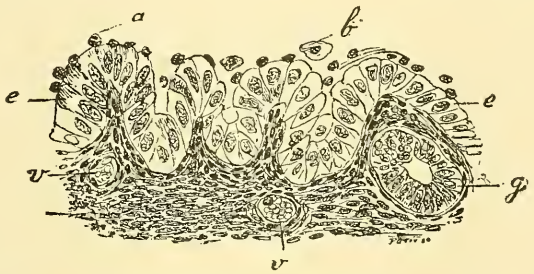

FIG. 204.—MUCOUS MEMBRANE OF THE CERVIX COMPRESSED AND ATROPHIED BY A CANCER DEVELOPED IN THE DEEPER LAYERS. × 300. *e*, *e*, Mucous cells of the clear epithelial investment, no longer having cilia; *a*, wandering cell on the surface of the epithelium; *b*, a desquamated epithelial cell; *t*, connective tissue of the mucous membrane compressed by the tumor; *v*, vessels; *g*, glandular tube (Cornil).

cancer, but beforehand we must carefully assure ourselves by examination of the adnexa that they are not the cause of a reflex hemorrhage. Occasionally, we can determine upon the organ so removed the presence of the characteristic lesions of epithelioma which were not demonstrable from the fragments obtained by the curette. Martin and Löhlein [15] have published cases of this nature which are very instructive to the clinician.

A fibroma which is undergoing cancerous degeneration may be recognized by the aid of the microscope. The presence of metastatic nodules of a cancerous nature in the vagina will render the diagnosis clear.

The prognosis is grave; nevertheless, an early operation has been followed by a long survival.

Etiology.—This form of primary cancer of the uterus is found chiefly in women who have reached the menopause, the average age

according to Hofmeier being fifty-four years. Among thirty-one cases of malignant tumor, comprising many varieties which Pichot removed,[17] only nine were below the age of fifty; in but one case was the influence of heredity manifestly present; nulliparæ were far more frequently attacked than in the case of cervical cancer. Only twenty-one per cent of Hofmeier's cases had never had children.

II. *Diffuse Sarcoma of the Mucous Membrane.*

Following Virchow, the name of diffuse sarcoma is given to thickening of the mucous membrane by proliferation of round or fusiform

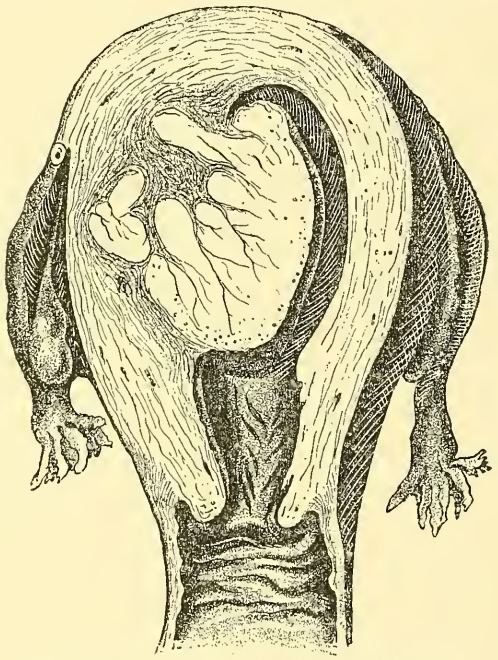

Fig. 205.—Sarcoma of the Uterine Mucous Membrane.

cells which infiltrate it and reproduce the type of young connective tissue, producing soft villous or lobulated tumors of an encephaloid aspect. This form of cancer is found most frequently in young women.

Pathology.—There is no need of dwelling upon the microscopic characters of sarcoma which here present nothing of special interest (Fig. 206), except to notice that the histological elements of sarcoma and cancer have occasionally been united in the same tumor, thus constituting a mixed form or carcino-sarcoma (Klebs).

When the sarcoma forms a pedicled tumor it may present in the cervix like a polyp.[18] Its ulceration and disintegration are more rapid than in the case of epithelioma, and when the process has begun it may destroy the uterine parenchyma.

Abel,[19] as I have already mentioned, affirms that diffuse sarcoma of the body of the uterus often coexists with circumscribed epithelioma of the cervix, but he seems to have taken a purely inflammatory lesion for a sarcomatous growth.

Symptoms and Diagnosis.—The symptoms resemble in many particulars those of the preceding form. There is hemorrhage, a serous discharge, and increase in the size of the uterus. The intro-

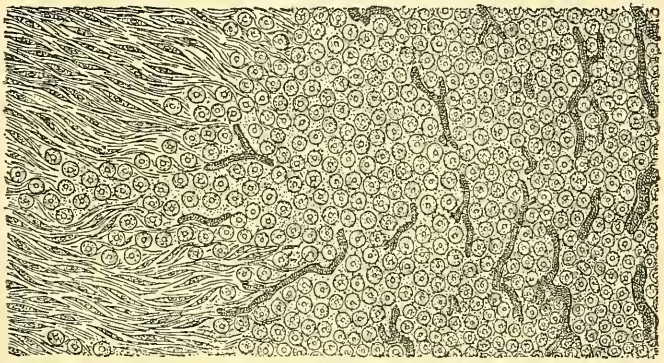

FIG. 206.—DIFFUSE SARCOMA OF THE UTERINE MUCOUS MEMBRANE. The neoplasm is separated from the peritoneum on the left by a well-marked layer of healthy muscular tissue several millimetres thick; the superficial portions toward the cavity of the uterus, on the right, are beginning to disintegrate. In the deeper parts are seen the connective-tissue fibrils, rich in fusiform cells with long and short processes. Between them is an amorphous basement substance with a large accumulation of round cells whose nuclei appear to resemble those of the others. In the superficial portions the bands of connective and muscular tissue have entirely disappeared, being replaced by round cells. The tumor is very rich in vessels, about which are foci of hemorrhage. In no part of the tumor can we find any trace of either mucous membrane or gland (Wyder).

duction of the finger discovers the neoplasm. The cervix is not involved. But sarcoma is distinguished from epithelioma by the following clinical characters. The discharge is less fetid during the early stages, the ulceration appears later, and the cervix is not so much dilated; possibly also a polypoid tumor may be found opening the cervix and descending into the vagina, at times causing inversion of the uterus. For the diagnosis from other diseases I refer to the preceding form.

Prognosis.—This is very grave, fatal recurrence being observed even when an early operation has been performed.[20]

Etiology.—One of the most remarkable characters which separates

this neoplasm from epithelioma, is the age at which it occurs, there being many cases of it among women of less than twenty years. Zweifel[21] has reported one case of hysterectomy performed for uterine sarcoma in a child of thirteen. It especially attacks nulliparæ. The first histogenetic stage seems to be an interstitial endometritis. As this has so often been observed in the body of the uterus when the cervix is the seat of epithelioma, it is conceivable that the metritis may transform itself into sarcoma, according to the still disputed opinion of Abel, whence the frequent coexistence of these two different neoplasms in the same uterus.

III. *Fibro-sarcoma.*

Synonyms: Sarcoma fibrosum seu nodosum, circumscribed fibro-sarcoma, sarcoma of the uterine parenchyma.

Pathology.—From a clinical point of view this form might be called malignant fibroma; like its benign homologues, it occurs as a submucous, interstitial, or subserous tumor. Like them also it takes its origin in the parenchyma of the uterus; but instead of being limited by a loose capsule it is, as a distinctive characteristic, deeply rooted. On section its surface is pale and its consistence homogeneous and soft. When it has a pedicle it is apt to be fibrous, showing that it has come from a degenerated fibro-muscular polyp. The vestiges of a structure which was at first benign may at times be recognized in the sessile tumors, but in others the characteristic tissue of sarcoma—namely, the accumulation of round cells, in places fusiform—is traversed by a few bands of connective tissue. It is very probable that a fibro-sarcoma always originates in a fibro-myoma; this degeneration may often be detected, as the remarkable observations of Chrobak, Müller, Simpson, Frankenhäuser, and Kurz[22] demonstrate.

Metastatic nodules have been observed in the vagina, the peritoneum, the lung, the liver, and the vertebræ.

Transformation of fibro-sarcoma into myxo-sarcoma, cysto-sarcoma, and other mixed forms is exceedingly rare,[23] of which a remarkable case of Gusserow's of a myxo-sarcoma with metastasis to the peritoneum, and another of Rabl-Rückhardt's, where there was a combination of carcinoma and fibro-sarcoma,[24] are noteworthy examples; the partisans of the proposition defended by R. Maier[25] might even see here a proof of the direct transformation of sarcoma into carcinoma.

Symptoms.—At first nothing distinguishes fibro-sarcoma from a benign fibroma, the signs being hemorrhage under the form of menorrhagia or metrorrhagia, with a serous discharge, a non-odorous hydrorrhœa, moderate pain and increase in the size of the uterus. The physical phenomena are those of a non-ulcerated tumor which may be reached by the finger if the cervix is dilated and the tumor submucous.

Later on, ulceration of the neoplasm alters the scene; the bleeding becomes an almost continuous oozing; the leucorrhœa has a fetid odor and contains débris which under the microscope is found to be made up of sarcomatous tissue; the pain increases and takes on a regular paroxysmal character, as already described under carcinoma of the mucous membrane. Local examination by the finger in the intact but dilated cervix permits us to feel the tumor which projects between the lips of the organ. The uterus may be greatly increased in size and is often retroverted and rendered immovable during the later periods of the disease. Inversion of the uterus has also been observed as a consequence of sarcoma (Simpson). The cachexia becomes progressively more pronounced.

Frequently this second phase is preceded by a temporary improvement due to the removal of the tumor under the idea that it is a simple fibroma, but even during the operation there is a suspicion that it may be of a more serious character because of the intimate fusion with the adjacent tissues which renders enucleation impossible. A rapid recurrence leaves no room for doubt; this character is so pronounced that English authors have termed it "recurrent fibroid." Freund has observed one very curious case of fibro-sarcoma in an atresic uterus which had caused hydrometra.

Diagnosis.—The suspicions to which the rational and general symptoms give rise are rendered certainty by the finger introduced deeply into the uterus, after dilatation if necessary. The only condition with which it might be confounded at the outset would be hemorrhagic metritis or fibroma. Later in the course of its development it might resemble a sloughing fibroma, an epithelioma, or a sarcoma of the mucous membrane. The examination by the microscope of fragments removed by the curette would be of valuable assistance in deciding the question.

The duration of the disease varies from four months (Frankenhäuser) to ten years (Hegar); the average, according to Regivue, is three years.

The prognosis varies, but is always serious; the disease recurs most quickly in young patients and with tumors of a very rapid development.

Etiology.—From all the cases published up to 1885, Gusserow derived the following table, which shows the influence of age:

Before 20,	4 cases
From 20 to 30,	5 "
" 30 " 39,	15 "
" 40 " 49,	28 "
" 50 " 60,	18 "
Above 60,	3 "

(of which 1 case was at 72 years).

This table demonstrates the predisposition created by the menopause as in the case of other malignant growths. In 74 cases analyzed by the same author in regard to fecundity and sterility, there were 23 women sterile, of whom 4 were virgins. This proportion seems very high and forms a contrast with that which I have said as to the predisposition of multiparæ to cancer of the cervix.

Treatment of Cancer of the Body of the Uterus.

There is no great difference in the treatment of the various forms of cancer of the uterus, that which follows applies as well to epithelioma as to sarcoma.

The indications are the same as for cancer of the cervix. Perform a radical operation wherever there is reason to hope that the disease may be removed entire and the gravity of the operation is justified by the great benefits which are to be derived from it; in other cases limit the interference to palliative treatment.

The method of choice is vaginal hysterectomy performed as early as possible, before there is much enlargement of the uterus. Schröder[26] advises us to remove by the vagina a tumor which does not exceed the volume of the fist; and though by fractional excision we can extract much larger tumors, yet when there is a cancerous uterus the chances of infection are so great that it should not be done. It is to be noted that the immediate success of the vaginal operation is much facilitated by the fact that the cervix is normal, so that there is but little risk of infecting the wound.[27]

If the uterus is too large to be removed by the vagina, and we are unwilling to attempt a succession of curettings and cauterization, we may have recourse to the sacral operation which I have described

in the preceding chapter, but this method is still too recent for final judgment. Up to the present time, when the uterus has been too large for vaginal extraction the custom has been to remove it through an abdominal incision. Two methods may be needed:

1. If the cervix has remained healthy, we may excise the fundus and use the cervix for a pedicle; in other words, perform a supra-vaginal hysterectomy (which should not be confounded with total hysterectomy). But unfortunately the cervix will furnish a stump which is far too short to be fixed externally, and it must therefore be abandoned within the peritoneal cavity, sutured by Schröder's method as described under the head of myoma. We must determine beforehand that it is healthy, and curette its interior and cauterize it with the thermo-cautery.

Abdominal hystercetomy for cancer of the uterus in Schröder's hands has given 4 deaths in 13 cases, or 39%.[28]

Rapid return of the disease is *à priori* to be feared from the fact that the section of the cervix necessarily goes so near to the altered tissues. However, in 11 cases of cure by Schröder 3 only succumbed to a recurrence during the first year, 4 were still in good health after two years, and 1 after five years. In the last edition of his book, Schröder speaks of one cure dating from five and one from seven years before, which evidently belonged to the same series.

2. If the uterus is very large and the cervix is involved, we can no longer do the supra-vaginal operation, but must perform total extirpation by the abdominal method.[29] This operation was formerly employed for all cancers of the cervix and body, but by reason of its alarming mortality there was a return to the vaginal method as far less dangerous. The operation of Freund as actually performed is only a return to a method proposed by Delpech[30] in 1830 (combining the hypogastric with the vaginal method). The typical operation of Freund as described in his first writings is no longer practised without the modification which was suggested by Rydigier[31] and which consists in freeing the cervix completely by the vagina before opening the abdomen. The perfected operation is performed as follows:

The patient is placed in Trendelenburg's position after the preparation which I have described for vaginal hysterectomy.

After the first and the second steps are executed, a tampon of iodoform gauze is placed in the vagina.

Third Step. Opening the Abdomen.—The incision begins at the umbilicus and extends to a finger's breadth above the pubes. It is well

to suture the abdominal wall in mass at each side of the lower angle of the wound to avoid laceration or stripping of the peritoneum. If the abdominal wall is very rigid, one or both of the recti muscles may be severed near their insertion. Credé[32] has proposed a very bold plan for the purpose of gaining more room, namely, the resection of a part of the pelvic wall. The intestines, which have a tendency to fall toward the diaphragm from the position of the patient, are held in that place by gauze compresses; but if there is no other way of obtaining room enough, a portion of the intestine may be drawn out of the wound and kept warm and moist by frequently renewed gauze compresses.

Fourth Step. Ligation and Section of the Broad Ligaments.—The uterus is seized with a Museux forceps and drawn strongly out of the abdomen. Freund then ties the broad ligaments in three portions. In passing the lowest thread which is to include the uterine artery, he uses a needle-trocar whose point can be pushed out of a canula and then retracted within it. When the operation has been begun by the vagina, this step is much simplified, for the uterine artery has already been tied from below. This preliminary has also the enormous advantage of enabling us to avoid the ureters more certainly, though it is also possible to see them after the abdomen has been opened. The vessels having been ligated, the broad ligaments are divided and the uterus removed. The separation from the bladder should be conducted with the greatest care after incision of the peritoneal pouch. If the patient is young, the ovaries and tubes should be removed with the uterus

Fifth Step. Dressing.—As in colpo-hysterectomy, the stumps of the broad ligaments are best sutured to the edges of the vaginal incision, whose size is somewhat diminished by two points of suture, then the toilet of the peritoneum is to be carried out, the abdominal wound closed, and iodoform gauze placed in Douglas' pouch and in the vagina.

Freund prefers to close the vaginal wound by carefully suturing its edges to the peritoneum above, passing the sutures by the vagina and exercising strong traction on the ligatures of the superior portion of the ligaments, causing their inversion, so that there shall be a large cicatricial mass in the place of the uterus between the bladder and the rectum.

Bardenheuer employs a very complicated method of drainage;[33] the most recent is a triple tube for the vagina of which the middle

piece is fenestrated and in communication with four branches which are placed in the peritoneal cavity; one of these may be brought through the abdominal opening.

Martin[34] advises that the order which I have given be reversed, first removing the fundus by laparatomy and then the cervix by the vagina. He has performed this operation three times with two deaths, while the third patient died of a return of the tumor within the first year.

The statistics which Hegar and Kaltenbach have given in 1881 comprise 93 cases, with 63 deaths, or 71%. In the last edition of their work (1886) they have presented the following figures: in 119 cases there were 80 deaths, or 67.2%; also 4 operations which were not completed and 1 whose result is unknown, that is, 5 which may be counted as among the fatal cases. The tumors recur very rapidly and in almost every case. The preceding authors do not know of more than a single case of permanent cure, namely, a patient operated upon by Freund in 1878. Whenever they could follow the case long enough they always saw a return of the disease after a short respite. Total extirpation by the abdomen is then an operation of gravity and of doubtful benefit; and for my part I prefer the sacral method when vaginal hysterectomy seems to be impossible.

When the limits of the uterus have been passed by the growth of the tumor, we are confined in our efforts to merely palliative treatment, the curette and cauterization (see chapter on treatment of cancer of the cervix).

Strict antisepsis of the vaginal and uterine cavities is here of great importance, for the products of the disintegration of the neoplasm have but one means of exit—by the cervical canal—and by their presence in these cavities they may produce the symptoms of putrid intoxication. I have seen patients who appeared absolutely septicæmic return to life, so to speak, after the use of the curette, antiseptic tampons of iodoform, and persevering intra-uterine irrigation. Many of these cases are described in the thesis of my brother, Adrien Pozzi.[35] The sublimate solution 1:5,000 is here more or less dangerous on account of the large absorbing surface. It must therefore always be followed by the use of filtered and boiled water, which is simply aseptic. For a more energetic disinfectant I am accustomed to employ injections of a cherry-red solution of permanganate of potash and as a deodorant one to two tablespoonfuls to the litre of Labarraque's solution.

In the case of acute septicæmic intoxication great benefit may be obtained from the introduction of small strips of iodoform gauze into the uterine cavity, leaving them in place twenty-four to forty-eight hours as a rapid and energetic means of disinfection. Antiseptic tamponing of the uterus has been recommended by Fritsch[36] after curetting for cancer, both as an antiseptic and as a hæmostatic.

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CHAPTER XVII.

DISPLACEMENTS OF THE UTERUS.

The uterus is connected posteriorly to the sacrum by the utero-sacral ligaments whose inextensible and resistant fibres are attached to the organ at the level of the cervix. Its connections with the bladder in front and the round and broad ligaments at the sides preserve its normal position of slight anteflexion, which it retains as a vestige of its fœtal condition.[1] The tonicity of the pelvic floor, of which the only weak point is occluded by the normal contraction of the vagina, prevents the abdominal contents from acting in the direction of their weight; the pressure is distributed over the whole surface and the uterus floats as if it were suspended in the midst of the organs of the lower pelvis which act as cushions for it. When the uterus is artificially drawn downward, this state of the pelvic contents becomes very apparent, for up to the moment when the utero-sacral ligaments are stretched and oppose any farther descent, the organ yields with but gentle resistance, as of a floating body which is slowly drawn under.

When the bladder is full, it pushes the uterus backward, so that its slight curve of anteflexion is obliterated, to be restored and exaggerated when the organ is again emptied. The rectum, when full, pushes the uterus forward and upward in a corresponding manner, though, in the physiological condition this motion is seldom so pronounced that its action is noticeable. In the case of the bladder, however, it is important, especially as social customs, which very quickly become organic habits, exaggerate it considerably.

There is then but one point of attachment where the uterus is at all firmly fixed, namely, that of the posterior ligaments, and, as they are inserted where the organ is thinnest, evidently its position may be compared to that of a pyramid balanced upon its point. This paradoxical condition does not exist in the lower animals but is an anomaly in the animal kingdom, explained by the upright position of the human species.

When we consider the extensive changes of volume, form, and con-

sistency which the uterus undergoes at each pregnancy; the alterations and lesions which may be produced by parturition on the adjacent organs, ligaments, muscles, and serous membrane; and finally the influence which efforts of all sorts may exert on an equilibrium so unstable—we are surprised that uterine displacements are not more frequent.

In the description of displacements I shall treat first of those which are produced in the vertical planes, comprising flexions and

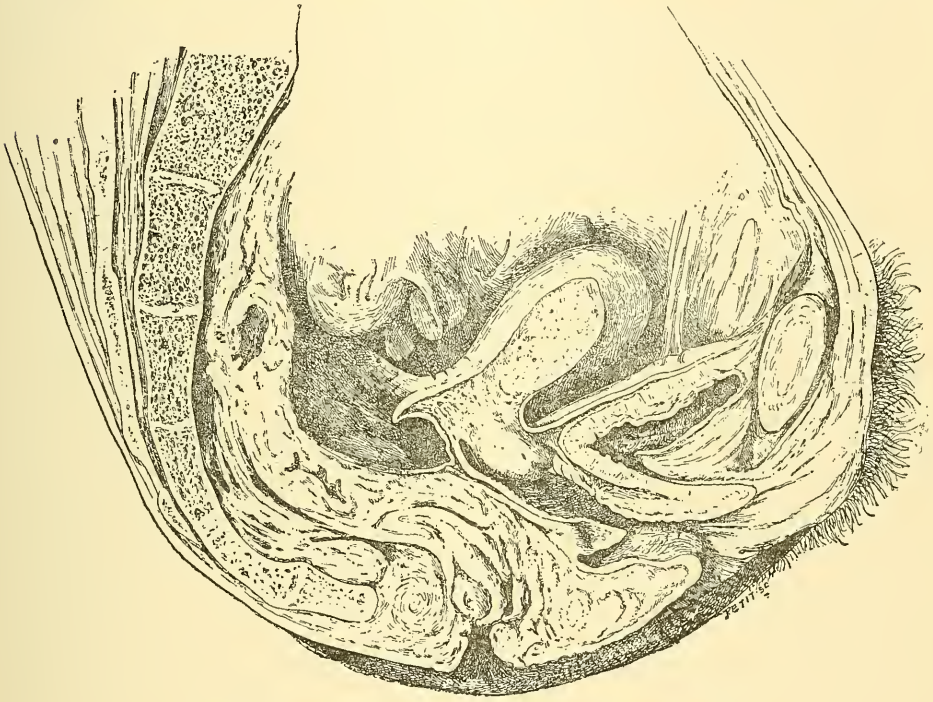

FIG. 207.—POSITION OF THE UTERUS, WITH THE BLADDER EMPTY.

versions, for which I reserve the name deviations, and next of those which follow horizontal planes, *i.e.*, elevation, prolapse, and inversion.

Classification.—The displacements in the vertical planes are commonly divided into versions or flexions according as the uterus as a whole is involved or only the body flexed on the cervix. There may be therefore ante- and retroflexion, ante- and retroversion, and latero-version and flexion. The latter are rare in the simple form, but they exist in combination with the others. When the uterus is displaced *en masse* backward or forward, it is called ante- or retro-position. two words which have only a descriptive value.

Historical Review.—The history of uterine deviations has passed through several phases. They were unknown at the time, before Récamier, when all uterine maladies without neoplasm were attributed to prolapse; by Récamier and Lisfranc they were relegated to the second placed by the prominence which these authors gave to ulceration; with Velpeau, on the contrary, their rôle in uterine pathology was much exaggerated.[2] This latter belief, by which displacements were made the chief factor in gynæcology, endured till Gosselin[3] produced a reaction in favor of metritis. The science becoming more analytic and more eclectic at the same time, the tendency was then to refer

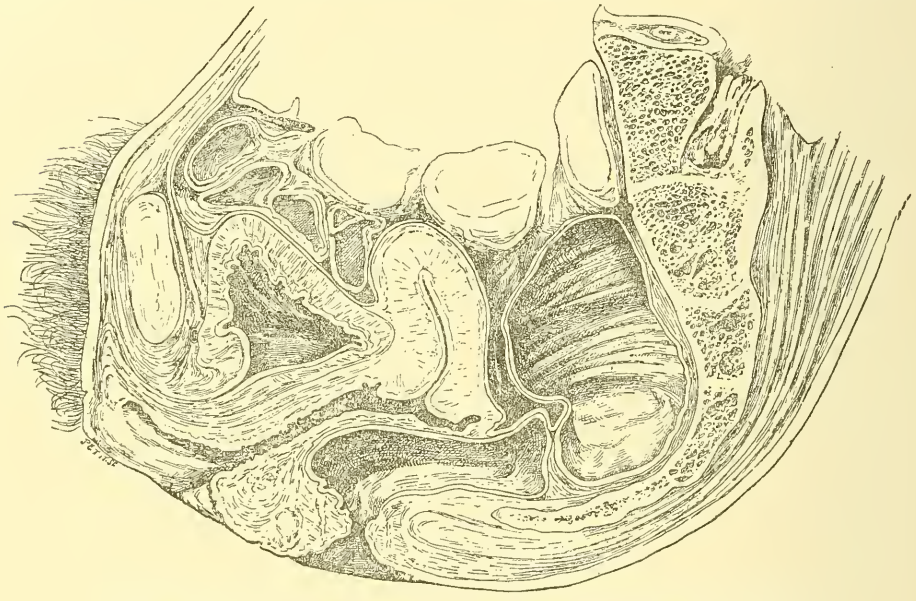

Fig. 208.—Position of the Uterus, with the Bladder Half Filled (Waldeyer).

each disease to its proper place. There were also new elements introduced, up to that time almost ignored, which resulted from pathological conditions of the adnexa.

As is well known, displacement by itself does not constitute a disease, but is only a factor, or the coefficient in a morbid complex into which the deviation enters only as a variable. There is no gynæcologist who has not seen marked displacement in women who presented no symptom of disease, and certain authors, basing[4] their statements on this fact, have not hesitated to deny the pathological importance of deviations completely. They go from the one excess to the other. If the displacement does not constitute a disease by itself, it creates

for the displaced organ a peculiar vulnerability which results from alterations in the circulation produced by the increase of the venous tension and the nutritive changes which may be the consequences of this condition; it favors and preserves inflammation of the uterus both in its cavity and on its surface.[5] Prolapse of the adnexa, moreover, which frequently accompanied the inflammation of the uterus, may be the source of reflex nervous troubles whose importance, especially in the posterior displacements, should not be neglected. And the adhesions of peri-salpingitis, when that is added, may fix the uterus in the vicious position, and thus render all resulting phenomena the more distressing.

From the preceding it is evident that the conception of uterine displacement, which was formerly so simple and referred to one point of pathology alone, comprehends for us, under the same clinical term, complex elements whose treatment should be considered of the first importance, even before that of the actual change in the axis of the organ; of these the chief are: Metritis; prolapse of the adnexa, either healthy or inflamed; peri-salpingitis; and, especially at the beginning of the treatment, excessive mobility of the uterus due to laxity of the ligaments.

Displacements Forward—Anteversion.

Pathology and Etiology.—The normal curvature of the uterus coincides fairly well with the curvilinear axis of the pelvis. In anteversion this curve becomes straight, as the uterus falls forward and the organ lies just behind the pubes upon the bladder, the cervix presenting directly backward (Fig. 209). The uterus is usually somewhat increased in size by a certain degree of metritis, and there often exists a perimetritic exudation toward one of the poles of the organ, sometimes in front at the level of the fundus, sometimes behind at the level of the cervix, which tends to fasten the uterus in its abnormal position.

The great cause of anteversion is to be found in the structural changes which occur after labor and abortion, or in the course of an abnormal involution, caused by a slight degree of infection. The organ takes the position while it is still soft and yielding, and maintains it because its normal tonicity fails to return. Then there are adhesions formed and the uterus becomes fixed. The presence of a tumor which by its weight causes the deviation is only of secondary importance.

[Anteversion being but an exaggeration of the normal position, but rarely causes symptoms or needs treatment except when complicated by parametritic adhesions or contraction of the utero-sacral bands, which markedly limit its mobility. In a limited number of cases of anteversion, with marked relaxation of the uterine supports and "descent" when in the erect position, the ring pessary may be needed as advised below.]

Symptoms.—The uterine syndroma which I have described in discussing metritis reappears here in all its characters. The rectal and vesical tenesmus are especially noteworthy, are exaggerated by the pressure of the uterine body and neck, but yet may be absent or

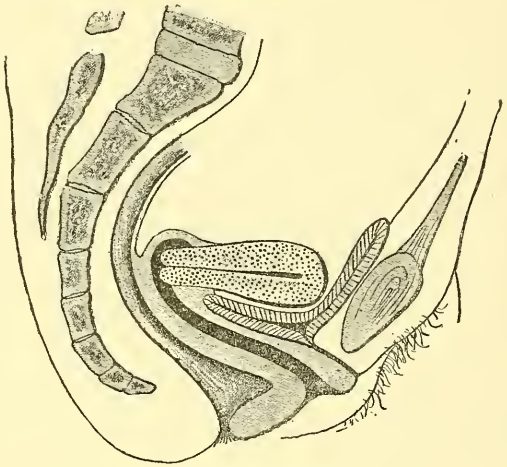

Fig. 209.—Anteversion.

may exist with simple metritis. The nervous reflexes which result are due to the uterine mobility and the entero-ptosis which it causes more than to the mere displacement, which is demonstrated by the effectiveness of immobilization by means of the pessary.

Diagnosis.—The diagnosis is easily made clear by bimanual palpation. The finger in the vagina seeks for the cervix far in the rear, then, carried forward, feels the body of the organ through the anterior cul-de-sac and may follow its anterior surface, while the hand placed above the pubes examines the posterior, placed horizontally. The passage of the uterine sound is usually difficult and is seldom necessary. It should be employed only when there is any doubt as to the nature of the tumor felt in the anterior vaginal pouch, or if the fundus cannot be differentiated from a tumor above it, such as a fibroma or an inflammatory or hemorrhagic exudation. Anteflexion may be recog-

nized by the curve which exists at the junction of the cervix with the body. To facilitate the passage of the sound into the cervix, the anterior lip may be seized with a tenaculum and drawn gently downward. Rectal touch in such cases is often of great service in determining whether the fundus is in its normal position.

Treatment.—As it is the metritis which causes the anteversion and keeps it up, we must address our efforts in the first place to that disease; but before beginning a vigorous treatment of the uterine mucous membrane, we must assure ourselves that there is no acute inflammation about either uterus or tubes. Should there be acute perimetritis or salpingitis, they should first be treated by appropriate means, among which I include very hot vaginal douches [110° F. and for twenty to thirty minutes], tampons of glycerin, frequent sitz baths, and vesication over the hypogastrium; then when every acute symptom has disappeared, we perform currettage and follow it by the injection of tincture of iodine or perchloride of iron as already described (p. 197).

There is no need here to replace the organ, for its position is only an exaggeration of the normal condition. If the pain persist after the metritis has been cured it can be due only to reflexes which take their origin from the relaxed ligaments and the entero-ptosis; it is then that the organ should be immobilized and sustained, and this may be accomplished either through the abdominal walls or by way of the vagina.

The best abdominal supporter in the case of forward deviation is that which carries a movable cushion, which may be managed by a strap or a channel and screw after its application above the pubes (see Fig. 210).

The most serviceable form of pessary in anteversion is that which I term "the indifferent," because its sole function is to distend the vaginal pouches and thus immobilize the uterus and maintain the cervix. The pessary which is called Dumontpallier's in France and Mayer's elsewhere, in the form of an elastic ring, is the best example of this indifferent class of instrument, easy to apply, withdraw, and clean. Special forceps have been invented for its introduction into the vagina without pain (Fig. 212), but with a little experience the same result is obtained by holding it between the index and the thumb. It is convenient to place the patient in the lateral or genu-pectoral position; then it is necessary merely to place the upper part of the pessary in the posterior pouch, push the anterior portion a

little upward, and it adapts itself automatically to the parts. Its size should be determined according to the dimensions of the vagina. A pessary which does not overstretch the canal or cause the patient in-

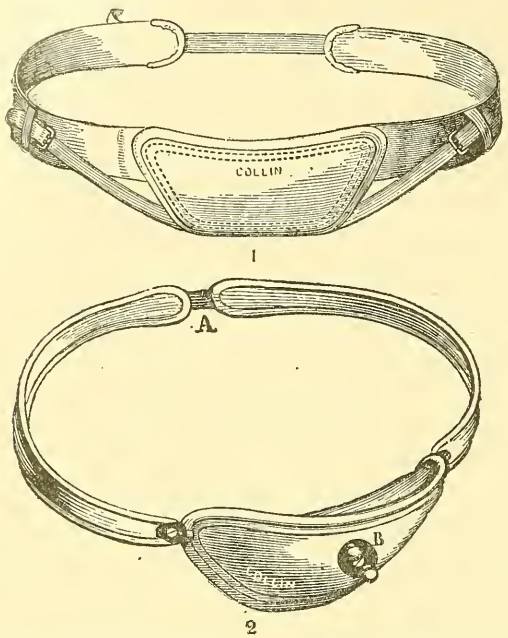

FIG. 210.—1, ELASTIC ABDOMINAL GIRDLE (PAYOT). 2, GIRDLE HAVING A MOVABLE PLATE WITH DOUBLE MOTION.

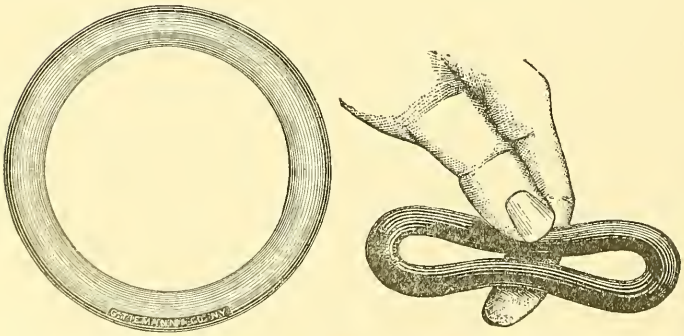

FIG. 211.—DUMONTPALLIER'S OR MAYER'S SOFT-RUBBER RING PESSARY.

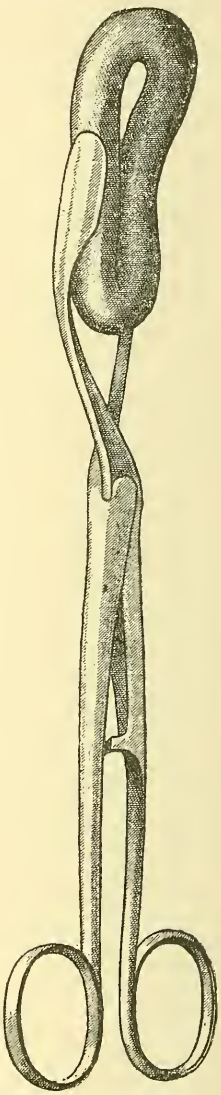

FIG. 212.—FORCEPS FOR INTRODUCTION OF RING PESSARY.

convenience may be left in place two or three months; it does not interfere with either coitus or fecundation. [While a well-fitting, polished hard-rubber pessary may often be left in place this length of time, any soft-rubber instrument should be frequently removed and cleansed,

as otherwise they soon become extremely offensive.] At the end of that time it should be taken out and cleaned in carbolic solution and the patient advised to go without it for a few days to see whether it is still necessary.

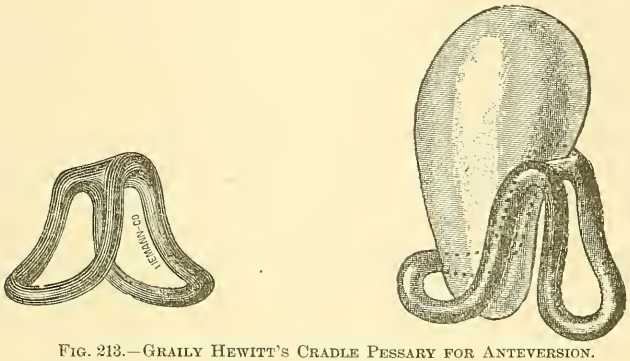

FIG. 213.—GRAILY HEWITT'S CRADLE PESSARY FOR ANTEVERSION.

Many special forms of pessary have been invented and advocated for anteversion, but I have never found them of the least advantage. The above cut shows the method of application of Hewitt's pessary. The use of Thomas' form will be more easily understood when we consider the figures relating to Hodge's pessary for retroversion, for it is like the Hodge but with the difference that it has a movable piece shaped like a horseshoe which passes in front of the cervix to sustain

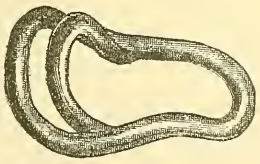

FIG. 214.—THOMAS' ANTEVERSION PESSARY.

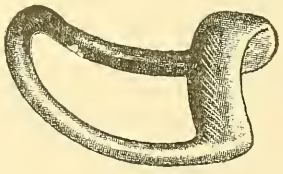

FIG. 215.—GALABIN'S ANTEVERSION PESSARY.

the uterine body. Galabin's model has its anterior portion much thickened for the same purpose.

As regards general treatment, the anæmia and the nervous excitability should be controlled. Preparations of iron and quinine, and hydrotherapy will be beneficial in many cases.

ANTEFLEXION.

Pathology and Etiology.—Anteflexion is an exaggeration of the normal forward curvature of the uterus. Before it was well understood it was frequently the case that a uterus in perfect position was

taken for one in a state of pathological deviation. It is difficult to draw a clear distinction between the physiological and the abnormal positions; but it might be said that the abnormal begins when the examining finger perceives the angle as a sharp bend in the axis of the organ.

[Schultze holds that this distinction is not an invariable one. He states that, as contrasted with the great mutability of normal anteflexion, stability is the characteristic most typical of pathological. Pathological anteflexion is then that position in which the uterus lies with

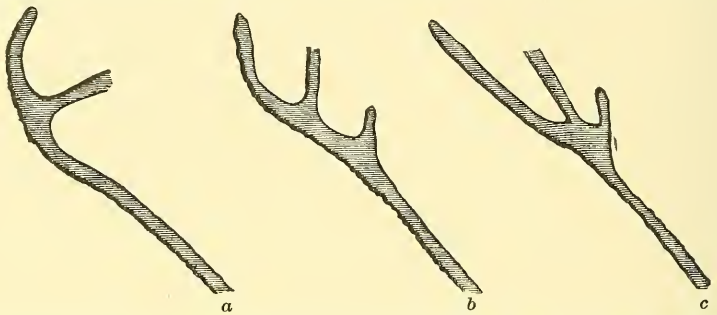

FIG. 216.—VARIOUS FORMS OF THE CERVIX, NATURAL SIZE (SCHULTZE). *a*, Fully developed normal cervix, normally inserted into the vaginal vault; *b*, an approximation to the condition in childhood often found in virgins and usually accompanied by flexion; *c*, cervix and mode of insertion normal during childhood; when found in the adult it is nearly invariably associated with sharp flexion.

its fundus permanently flexed over its anterior surface and more than normally stabile.]

T. Gaillard Thomas distinguishes three varieties:

1. Corporeal flexion, where the body is bent upon the cervix which is normally placed; this is the usual type.

2. Cervical flexion, where the cervix is bent upon the body.

3. Cervico-corporeal, where the segments of the organ are bent the one upon the other.

Etiologically there are two forms, the congenital and the acquired.

In the fœtus and in early infancy the cervix is relatively much developed while the body is still small, and there is an exaggerated curve between them; if at the time of puberty the growth of the uterus is irregular and the anterior wall is retarded in its development while the posterior increases in size, the congenital form of anteflexion manifests itself. As a second mark of arrested growth, the cervix may be very long and conical (Fig. 217), with the vaginal portion tapering and the external os very narrow. At other times atrophy of the anterior lip may be pronounced and thus furnish an indication of the condition of the corresponding uterine wall. This

congenital anteflexion has been observed with hypoplasia of all the genital organs and a narrow pelvis.

The congenital forms do not present so acute an angle of flexion

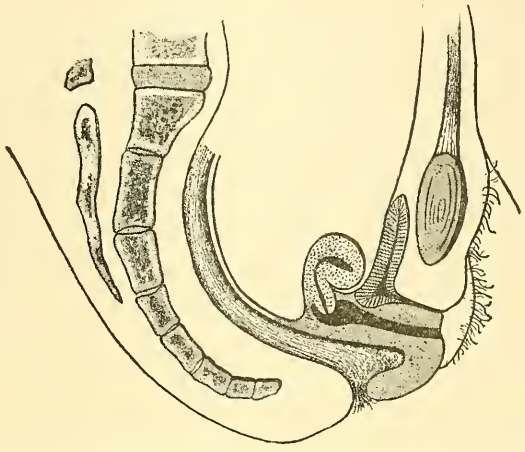

FIG. 217.—ANTEFLEXION OF INFANTILE ORIGIN. The angle is acute and the fundus globular.

as the acquired forms, but correspond generally to the first two varieties of Thomas.

The anteflexion may be acquired at the time of the establishment of puberty if, when the uterus is engorged and softened during the

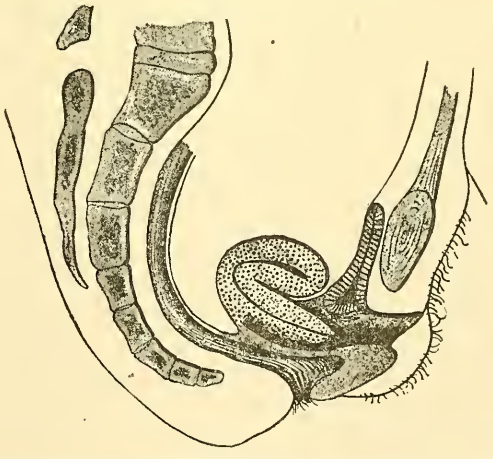

FIG. 218.—VERY ACUTE ANTEFLEXION WITH HYPERTROPHY OF THE VAGINAL PORTION OF THE CERVIX.

first menstrual periods, the hygiene of the young woman is improper. Any overstrain or great fatigue, masturbation, and all the causes of virginal metritis may here play their part in developing both an inflammation and a deviation. It is readily seen that the general soft-

ness of the organ permits it to bend at the isthmus as upon a hinge and to become flexed to the side or to increase its infantile forward curve. Cases have been observed where a fall was the starting-point of this condition.

Metritis of puerperal origin may be counted among the causes of acquired anteflexion, though it more commonly produces a retroflexion. It has been attributed with much reason to absence of sufficient involution of the posterior wall after labor and abortion,[6] and this may be due to the persistence of portions of the membranes or placenta causing a very intense local infection at the place of their adhesion. Schultze,[7] after E. Martin, has attributed great importance to parametritis situated posteriorly, involving the utero-sacral ligaments and

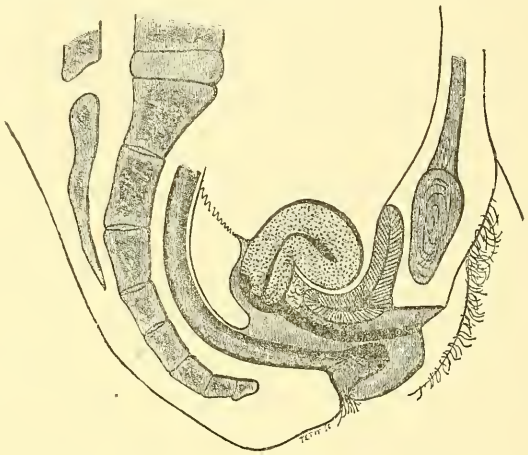

Fig. 219.—Anteflexion from Contraction of the Utero-Sacral Ligaments.

causing their contraction (Fig. 219). He also asserts that in such cases the cervix is placed much higher than normal in the pelvis, and the vagina thus undergoes elongation. The origin of the posterior parametritis he finds in puerperal or gonorrhœal infection.

I am of the opinion that this is most frequently due to peri-salpingitis about the diseased adnexa. The adhesions which result and which fix the cervix strongly from behind cause the uterus to fall forward and flex it at the isthmus, which is weakened by the accompanying metritis, while the cervix, hypertrophied and sclerosed by an old inflammation, remains rigid (Fig. 220). The subvaginal elongation of the cervix results in inveterate catarrh, which often coexists with anteflexion, as has been well described by A. Martin; this author considers the congenital lesions of but little importance.[8]

Symptoms.—Congenital anteflexion is accompanied by amenorrhœa, or delay in the appearance of the menses, when it coincides with an infantile condition of all the genital organs. If the periods begin at the normal time, they are apt to be at long intervals and irregular. At other times with a normal flow of blood there appear the symptoms of dysmenorrhœa. Violent pains in the loins occur while the blood distends the uterus above the point of flexion, then, suddenly, the obstacle is overcome and the blood is expelled in a clotted flow, which may have a very strong odor, due to its long stagnation. The mechanical theory of the pain of dysmenorrhœa depending upon anteflexion has been generally received since it was made known by Simp-

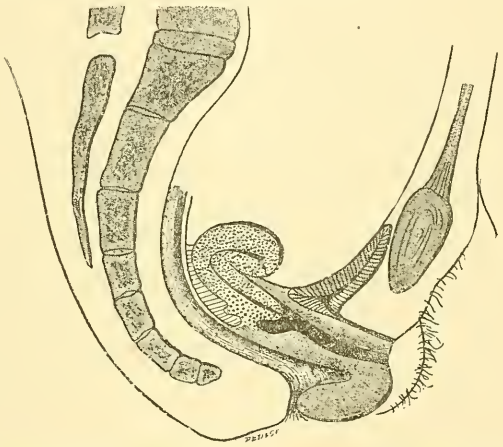

Fig. 220.—Anteflexion Combined with Retro-Position and Posterior Adhesions.

son and Sims. It is not, however, accepted by Fritsch, who explains the pain as due to irritation of the nerves from congestion by the abnormal vascular tension produced by curvature of the vessels at the point of the flexion. It is difficult not to attribute great importance to the obstacle, in view of the paroxysmal character of both pains and discharge. We may also ask whether the posterior perimetritis noted by Schultze is not as often the result of the anteflexion as its cause, when every month there are a few drops of blood forced through the tubes into Douglas' pouch, producing thus a kind of miniature and periodic hæmatocele. Thus we might explain the acute and febrile phenomena with which these crises of dysmenorrhœa sometimes terminate.

These patients present all the symptoms of the uterine syndroma.

The dysuria is ordinarily very marked and the reflex nervous symptoms are bitterly complained of.

Pain often occurs in sexual intecrourse, the dyspareunia of Barnes. Sterility is the rule, and should conception take place, abortion is probable.

Diagnosis.—If the case is one of the frequent acquired anteflexions, the so-called corporeal, the finger feels the fundus in the anterior vaginal pouch, curved like a pistol handle and almost on the same plane as the cervix. By pressing the organ down in bimanual palpation, the body of it is rendered accessible and the finger can appreciate its curve and angle of flexion. while the cervix is found in the normal axis.

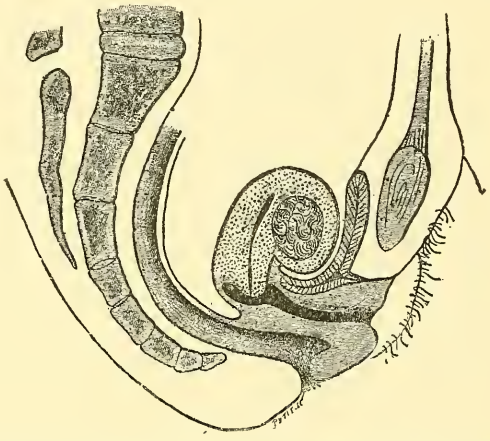

Fig. 221.—Anteflexion Simulated by a Fibroma in the Anterior Uterine Wall.

In the cervical variety of the affection the cervix is, on the contrary, oblique from above downward and from before backward; by touch alone we might then think of retroversion, but bimanual palpation discovers the fundus in the normal situation.

In the cervico-corporeal variety the direction of the cervix is the same as in the preceding form, but the fundus is also curved and hidden behind the pubes; by exploring the anterior cul-de-sac in front of the cervix it may be felt. At times, when the uterus is thus rolled on itself, there is nothing to be felt but the angle of flexion; and above it a rounded mass which might very easily be taken for a fibroma or an inflammatory exudation. The opposite mistake has also been made (Fig. 221). The uterine sound is of great service in these cases. Its introduction may be rendered easy by seizing the cervix with tenaculum forceps and drawing it down and back, when

the sound, properly curved, is passed in with great care and gentleness in the supposed direction of the uterine cavity, while one finger presses on the fundus through the anterior vaginal pouch to straighten it a little. When the sound is in the uterus the organ may be restored to its normal shape by merely carrying the handle of the instrument forward. Then the two surfaces of the organ may be examined by rectal touch and bimanual palpation, to discover the presence of any tumor which may coexist and to estimate the uterine mobility. To avoid all danger of interrupting a beginning pregnancy, this examination should be made only shortly after a menstrual period.

A calculus in the bladder, pressing upon the anterior cul-de-sac, could only be mistaken for anteflexion when the examination of the uterus and vesical catheterism were not combined.

Treatment.—The indications are to relieve symptoms, to cure the pathological conditions of the mucosa, to induce a return to the normal in the muscular tissue and to restore the normal uterine position. Acquired anteflexion causes but little disturbance except when there is coincident inflammation or when it presses upon the bladder or with a very movable uterus. Relief may be obtained by either a girdle or a pessary without the need of previous reduction (*vide supra*, Anteversion).

The treatment should be directed chiefly against the coexisting metritis. In simple cases curetting followed by iodine injections will be found sufficient. With marked cervical hypertrophy Schröder's biconical amputation or excision of the mucous membrane will be required. This causes a rapid and progressive involution of the hypertrophied cervix, which much exceeds the immediate results obtained by the bistoury, and which with the amelioration of the metritis causes the disappearance of the morbid symptoms which are attributable to the deviation. The displacement corrects itself little by little. It seems probable to me that the good effects of Sims' "sagittal discission" (Fig. 222), which has enjoyed such favor and been so much abused, should be referred to the indirect action of the operation upon the involution of the uterus and its influence on the metritis, rather than to the mere re-establishment of the normal calibre of the cervix.

Congenital anteflexion claims our interference only because of the very painful dysmenorrhœa or the sterility which it causes. If we decide to straighten and dilate the organ, as has been recommended,

it is well to precede every attempt at straightening by the use of laminaria tents, after determining the extent and direction of the uterine cavity by the sound. The laminaria tents, treated with iodoform and sufficiently thin, are supple enough to permit a good deal of curvature. It is useless to attempt too great a dilatation; the principal office of the tents is to soften the tissues and make them more supple in view of the final restoration of the form of the organ. This is begun with the dilatation itself. After dilating, enlarging, and somewhat correcting the axis by the use of a few tents, we may continue by passing Hegar's bougies once or twice a week, aiding the manœuvre by fixing the cervix with tenaculum forceps and by pressure on the fundus by the finger in the anterior vaginal pouch; the process should be completed with sizes No. 10 or 12. Rapidly straightening the uterus with a sound, returning it to its position by a "*tour de*

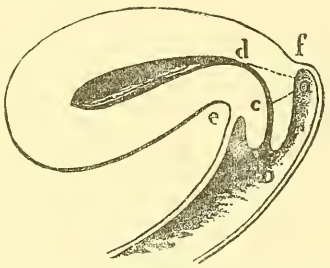

Fig. 222.—Sagittal Discission of the Cervix in Cervical Anteflexion (Sims). *a*, *b*, *c*, portion of the cervix divided by the scissors; *c*, *a*, *d*, triangular portion which escapes the scissors and which is divided by the probe-pointed bistoury; *e*, *f*, supravaginal portion of the cervix where the flexion occurs.

maître," which temporarily carries the organ backward, is here always out of place.

Since the case is almost always one of incomplete development, the progressive dilatation and the frequent passage of sounds will produce a fluxion to the part and an increase in its nutritive activity, which are probably the chief advantages of the method.

In addition to the pessaries which I have described, which are applicable to both anteflexion and anteversion alike, special forms have been invented for anteflexion. That of Fancourt Barnes is a combination of the Hodge model with the Hewitt. Thomas has invented a complicated form composed of a Smith pessary supporting a cup with an intra-uterine stem. I much prefer abdominal girdles to vaginal pessaries in both anteversion and anteflexion, but among the latter I consider Dumontpallier's ring sufficient.

The stem, or intra-uterine, pessary [9] so warmly advocated in Eng-

land by Simpson and in France by Valleix,[10] which has caused so many accidents before the days of antiseptic surgery, should be employed only in exceptional cases.[11] When the patient is a weak and timid young woman who is very nervous and for whom the repeated manœuvres of progressive dilatation would be torture or at least present a real difficulty every time, we are authorized to leave an agent within the uterus which shall gradually straighten and dilate it. The older forms of pessary had a stem which was perfectly straight, which is erroneous, as the normal uterus has an anterior curvature. They were often composed of two metals, copper and zinc, whose galvanic action was thought to aid the salutary action of the dilatation. Fehling constructed a far more rational instrument consisting of a tube of thick glass, fenestrated, provided with a bell mouth, and slightly curved; this curve could be altered by heat.

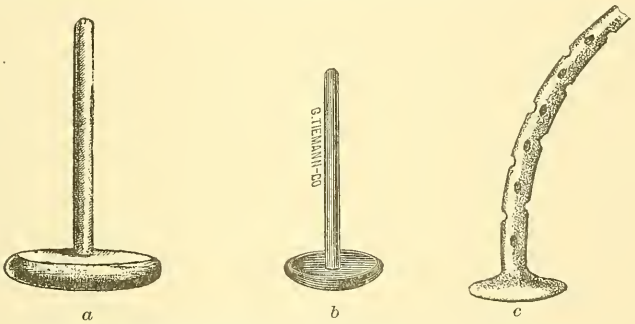

Fig. 223.—Stem Pessaries. *a* and *b*, Common forms; *c*, Fehling's.

This tube was to be filled with powdered iodoform and introduced into the uterine cavity, with care that the tube be about one-half centimetre shorter than the canal, previously measured. The patient is kept in bed and under observation for eight days; then she is allowed to rise, but the stem is not removed, according to this author, before eight or ten months.[12] It is kept in place by the projection of the mucous membrane into the fenestræ of the tube, and, being light, has but little tendency to fall out (Fig. 223, *c*). I think that this delay of eight months is too long, and that the good effects should be produced within one or two. [Vide Dysmenorrhœa.]

The chief cause of the dysmenorrhœa in congenital anteflexion is in the conical cervix with its stenotic external os. To relieve this stenosis, crucial incision with the bistoury has been practised for a long time. Simpson's metrotome, Collin's hysterotome, or Küchenmeister's scissors may be employed.

The results so obtained are not permanent, for the cicatrization re-establishes the original conditions; a stomatoplastic operation by biconical amputation of the cervix is far preferable.[13] (Vide Cervical stenosis).

The operation of discission in cervical anteflexion is sometimes performed for the relief of sterility. Marion Sims (Fig. 222) incised the posterior lip of the cervix with his short and curved bistoury. Emmet practised the same incision with elbowed scissors, which are

Fig. 224.—Collin's Hysterotomy.

preferable; he straightened the canal by making an incision on its anterior face with a short tenotome a certain depth into the tissues and kept the cut open by means of a glass tube. He thus removed a triangular piece or the whole of the posterior lip. More complicated plastic operations have been proposed, like Küstner's [or Dudley's[14]], but I reject them all. If there is any deformity of the cervix, amputation of the part is preferable (according to the rules given under Metritis), taking care to leave a sufficiently large os.

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CHAPTER XVIII.

DISPLACEMENTS OF THE UTERUS—Continued.

Posterior Deviations.

Displacement of the uterus backward is far more frequent than any other variety. Sänger,[1] among 700 gynæcological patients, found 108 cases of retro-deviation, or 15.14%. Winckel obtained 19.10%, and Löhlein 17 or 18%.[2]

I. *Retroversion.*

Pathology; Etiology.—Every time that the bladder empties itself, the uterus is placed physiologically in a temporary position of retroversion. The tonicity of the broad, round, and utero-sacral ligaments,

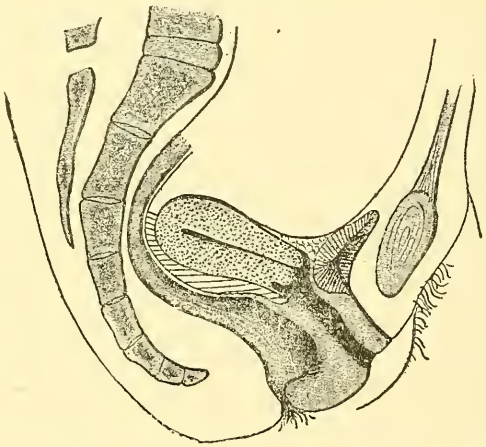

Fig. 225.—Retroversion with Posterior Adhesions of Large Extent.

which, it must not be forgotten, contain much muscular tissue, ordinarily sustain the uterus in its normal position; but when it has become increased in weight by inflammation and especially by retarded involution after parturition, the ligaments themselves undergo a relaxation, while the uterus is rendered turgid by metritis, and the abnormal position may become permanent under the influence of prolonged dorsal decubitus.

Then the uterus often becomes fixed in the new and abnormal situation, by adhesions, the result of a local pelvic peritonitis originating from an inflamed tube which may be the antecedent and chief cause of the whole disturbance. A sudden effort or a fall is often the determining cause of the deviation;[3] retroversion is not so common as retroflexion.

Symptoms.—When the displacement has occurred suddenly, it is often accompanied by acute pain and various nervous phenomena; when it is acquired slowly, its symptoms are often not to be distinguished from those of a metritis or of a circumscribed perimetritis which may have preceded it, and with these we find the uterine syndroma. Sterility is the rule. Vesical and rectal tenesmus may either be very marked or absent altogether. Palpation and touch recognize the position of the cervix forward and that of the fundus posteriorly toward the concavity of the sacrum, where it is more or less immobilized. The two segments of the uterus are found in the same straight line.

Diagnosis.—Bimanual palpation with rectal touch, and the use of the uterine sound if necessary, are the means by which this form of displacement may be recognized. The distinction from retroflexion is found in the fact that there is no angle in the organ between cervix and fundus. It should not be confounded with fibroma of the posterior wall, with a retro-uterine hæmatocele, tumor of the ovary or tube prolapsed into the cul-de-sac of Douglas, with a focus of parametritis or with a scybalous accumulation. Almost all cases where any doubt could exist are easily made clear by the uterine sound combined with other means of exploration; this instrument being especially useful where we must differentiate the condition from anterior cervico-corporeal displacement, which, in view of the direction of its antero-posterior axis, is almost necessarily a source of error if we confine our examination to touching the cervix alone.

Treatment.—This is similar to that for retroflexion.

II. *Retroflexion.*

Pathology; Etiology.—Contrary to the forward deviations, retroflexion seldom exists from childhood or puberty, although it may follow virginal metritis, habitual constipation, and masturbation (Fritsch). In the immense majority of cases the retroflexion succeeds to a metritis of puerperal origin; the subinvolution of the anterior

face where the placenta is inserted plays here, according to E. Martin, a rôle similar to that which I have indicated for anteflexion.

Considerable importance must also be attributed to the weight of the congested organ, and to relaxation of the broad and round ligaments, which cease to hold the uterus in place anteriorly, while the cervix remains fixed by the more resistant utero-sacral ligaments. The flaccidity of its own supports thus allows the uterus to bend backward at the level of the isthmus, impelled by the weight and pressure of the

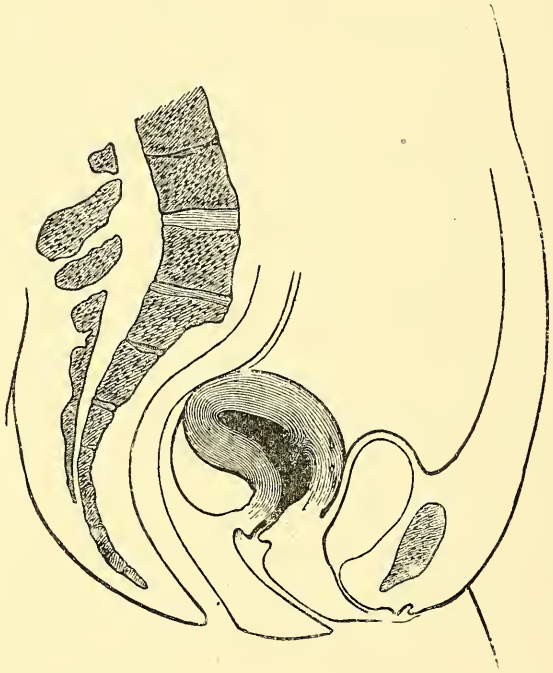

FIG. 226.—RETROFLEXION OF THE UTERUS FROM SUBINVOLUTION OF THE ANTERIOR WALL, ON WHICH MAY BE SEEN THE SITE OF PLACENTAL INSERTION (E. MARTIN, SR.).

intestines. Retroflexion has been observed to follow simple retroversion and even anteversion; in the latter case this is possible when the seat of the flexion remains soft and movable like a hinge. The cervix is directed downward and forward, ordinarily approaching the vulva, for it is usually a little lowered. The external os is somewhat patent and its lips are swollen, owing to the disturbance of the venous circulation which results from the curvature of the vessels. It must not be forgotten that the displacement almost always happens in a woman who has had at some time metritis of puerperal origin.

The body of the organ occupies the pouch of Douglas. On one or the other of its walls there has been found a marked thinning, anteriorly by Ruge, posteriorly by Fritsch.

Adhesions are often present, either perimetritic from exudation into Douglas' pouch, or parametritic from similar conditions about the utero-sacral ligaments. According to the opinion of Schultze, relaxation of the folds or ligaments of Douglas under the influence of posterior parametritis play a great part in the production of all the uterine displacements.[4] In order to comprehend the production of retroflexion, we must suppose that during a first stage of acute inflammation the ligaments preserve all their resilience in such a way that the cervix becomes fixed; soon after, in the stage where the exudation retreats, the denutrition of the ligaments causes their flaccidity; then, according as the cervix has resisted or become flexed in the first stage, we have a retroversion or flexion. In other words, version presupposes alteration in the ligaments; flexion, an altered condition of both ligaments and uterine parenchyma together.

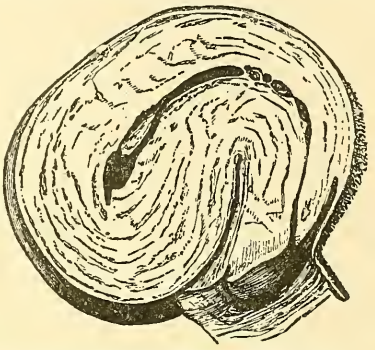

FIG. 227.—EXTREME RETROFLEXION OF THE UTERUS.

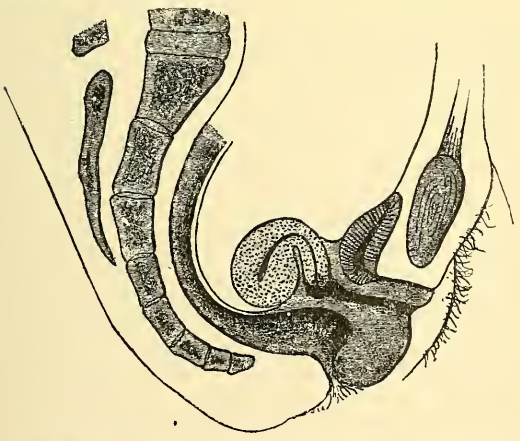

FIG. 228.—RETROFLEXION OF THE UTERUS IN A NULLIPARA. The cervix is movable, the os has preserved nearly its normal position.

The peritoneal adhesions fix the uterus to the bottom of the recto-uterine pouch, by bands often loose, filamentous, and easily torn. At other times they are funicular, lamellated, and firm. The ovaries and tubes are often drawn by the deviation into the cul-de-sac. It is probable that a part of the nervous reflexes, often grave even to the production of paraplegia, which have been noted in cases of retroflexion, are due to the dragging upon the nerves, and not to the problematical compression of the sacral plexus.

Salpingitis often coexists, and is the rule in the irreducible cases,

the fact that the organ cannot be reduced very frequently depending upon the presence of adhesions between the adnexa and the wall of the pelvis. Exacerbations of the salpingitis are the cause of these adhesions, and also of the hard, often painful nodules that so rapidly appear and disappear about the lateral and posterior surfaces of the retroflexed organ.[5]

Symptoms.—The uterine syndroma is present, the reflex nervous phenomena are very well marked, and there is sterility. Constipation, with or without tenesmus, is peculiarly obstinate, and Barnes attributes to this the copræmia which so often debilitates the patient.

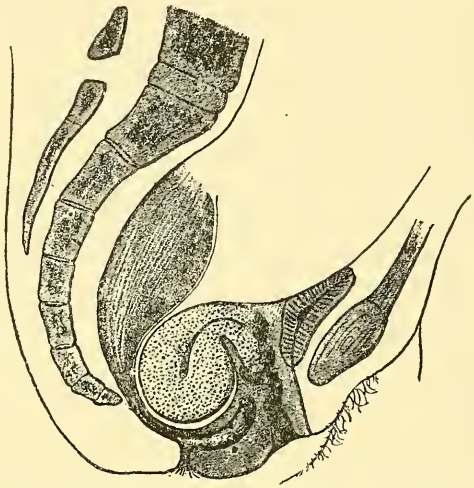

FIG. 229.—RETROFLEXION OF THE UTERUS, VERY PRONOUNCED. Compression of the rectum, whose lumen is effaced; hypertrophy of the cervix; atrophy of the angle of flexion; thickening of the posterior lip; thinning of the anterior lip which is hidden in the bottom of the cul-de-sac.

The nervous reflexes appear most often as difficulty in walking markedly out of proportion with that caused by simple muscular fatigue and simulating paraplegia, as multiple neuralgias, hysteriform excitability, fitful cough, dyspepsia, etc. Schröder has observed chorea;[6] Chrobak, very intense asthma;[7] Kehrer, aphonia;[8] Sielki, hystero-epilepsy;[9] Kidderlen, incessant vomiting.[10] Simple straightening of the uterus has caused all these symptoms to disappear rapidly.

Sterility is usually the sequence of retroflexion, though at any time fecundation may take place and the uterus return to its proper position. If it remains flexed and incarcerates the fœtus in the lower pelvis, it produces serious compression symptoms or abortion. If

involution proceeds under the most favorable conditions after labor, the uterus may correct its own malposition spontaneously. That pregnancy in such cases may be a valuable therapeutic measure cannot be denied, and yet its importance has been much overestimated.

Certain authors describe a post-puerperal retroflexion where the displacement occurs immediately after confinement. This is often only one of the symptoms of a post-puerperal metritis with retarded involution, and disappears with the latter under appropriate treatment.

Diagnosis.—The tumor occupying the posterior cul-de-sac may, by means of bimanual palpation, be easily recognized as the fundus from the absence of resistance in the anterior pouch where the organ is normally placed, and the possibility of feeling the angle of junction between the cervix and the fundus. Rectal touch is here often indispensable. Exploration with the sound removes the last doubts; it should be curved to suit the axis of the uterus, and the cervix seized with tenaculum forceps and drawn downward. Further details of diagnosis will be found under the head of retroversion, to which I refer (see page 435).

It is necessary to clearly determine the degree of mobility of the uterus before entering upon any treatment, and from this point of view Trélat[11] divides retroflexions into three classes—(1) reducible; (2) resistant; (3) adherent. These different grades may be appreciated after efforts of reduction, either by the bimanual procedure or by the sound, by estimating the resistance encountered and by the permanence of the reposition.

Treatment.—Whether the complicating metritis should first be treated or the displacement reduced is a disputed question. I think it is well to treat the inflammation first, and for this purpose to employ the curette followed by injections, and, in case of metritis which is chronic and painful [with cervical laceration and hyperplasia], to amputate the cervix [or perform Emmet's operation] (p. 206 *et seq.*). It is not unusual to see the pains of retroflexion cease when the metritis has been cured, and also a certain degree of reduction may result from the subsequent involution. It is well in special cases to dilate the cervix, before curetting, with laminaria tents, which effectually begin the work of straightening the canal.

If with the metritis there is also an acute perimetritis, with perisalpingitis, this should be treated by appropriate means (hot injections, baths, application of iodine, glycerin tampons to the cervix, etc.), and only when all inflammatory symptoms have ceased should

we make an effort to reduce the uterus and maintain it in place; the contrary practice advised by Poullet[12] appears to me unwise.

Reduction of Retroflexion.—This may be accomplished in many ways:

1. *By the Genu-pectoral Position.*[13]—When the woman has been put in the genu-pectoral position with the legs a little separated, and the fourchette retracted so as to allow the entrance of air into the vagina, the viscera fall toward the concavity of the diaphragm (Fig. 230) and the retroverted or retroflexed uterus, if freely movable, is restored to its normal position. This reduction may be aided by keeping the vaginal walls separated and applying traction to the posterior cul-de-sac with a speculum blade which depresses the fourchette. This "spontaneous reposition by air," as Courty terms it, is a valuable exercise which the patient may every day repeat, morning and evening, for a few moments, placing herself in the attitude of a praying Mahometan." Tarnier[14] advises the patient, when she takes this position, to introduce a small speculum of wire or simply an injection nozzle into the vagina to facilitate th entrance of air and the upward movement of the uterus. E. Mosher[15] recommends his patients to pass the finger into the vagina and press upon the anterior face of the cervix, which has the effect of making the uterus revolve forward. If this procedure is not sufficient for many cases, it is still a valuable auxiliary where the trouble is not inveterate. Patients should also be advised to sleep on the face or side.

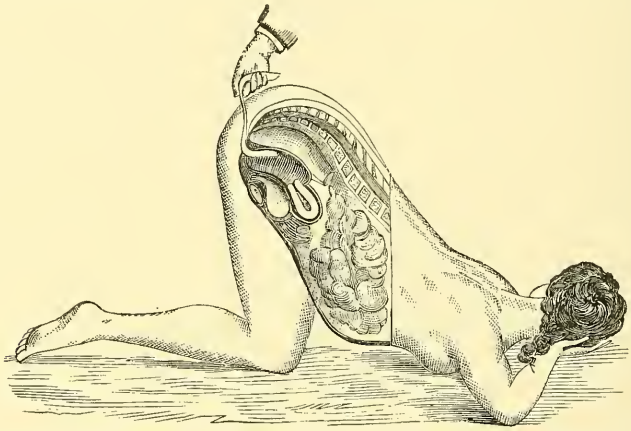

Fig. 230.—Reduction of Retroflexion in the Genu-pectoral Position.

[In using the genu-pectoral position it is necessary to see that there are no constricting bands or corsets about the waist to interfere with

the free forward and upward falling of the abdominal viscera. If after the perineum is retracted and the vagina allowed to "balloon" (an effect caused by the traction of the inverted abdominal contents) the fundus remains fixed behind the sacral promontory, it may often be dislodged by drawing the cervix down toward the vulvar opening and backward by a tenaculum forceps, and, if this is not sufficient, by pressure at the same time against the fundus by the fingers, or a wad of gauze held in a dressing forceps. Occasionally, especially where we

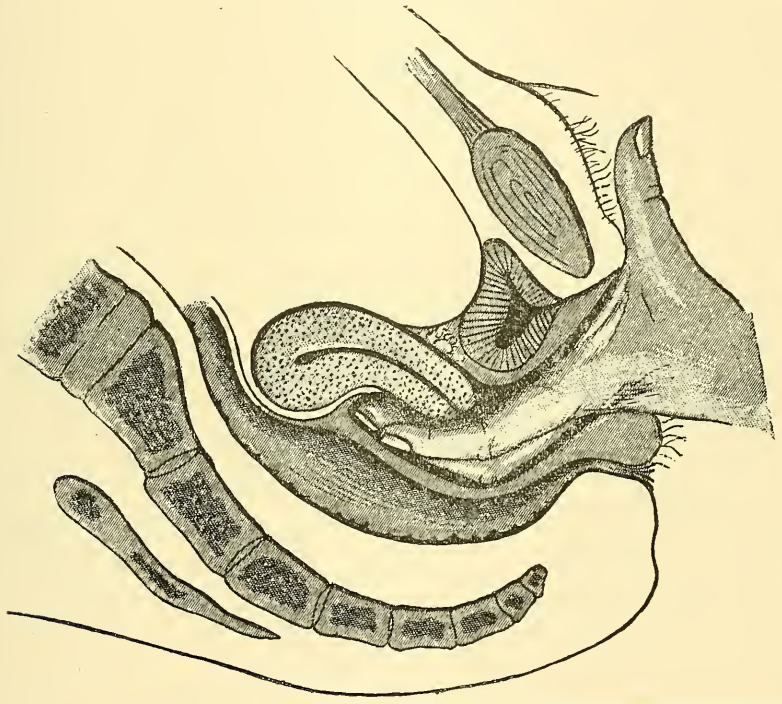

FIG. 231.—BIMANUAL REDUCTION OF A RETROVERSION OR FLEXION. First step. Elevation of the uterus.

have to do with an incarcerated retroflexed gravid uterus, it may be necessary to employ manual pressure, or a colpeurynter, through the rectum.]

2. *Bimanual Reduction.*—The patient may be put in Sims' position, or even in the genu-pectoral if necessary; two or three fingers of the left hand are then placed in the rectum or the vagina, and the cervix is pressed backward, while the right hand on the abdominal surface endeavors to seize the fundus and bring it into the position of anteversion; the new position of the organ must be exaggerated to successfully combat the tendency to return to the displacement.

This manœuvre may be much simplified by seizing the cervix with tenaculum forceps and drawing it gently downward.[16]

Schultze[17] has advised in difficult cases to introduce the finger into the previously dilated cavity of the uterus; and by energetic traction thus exerted directly upon the uterine tissues, break up any adhesions which have formed between the organ and other structures which op-

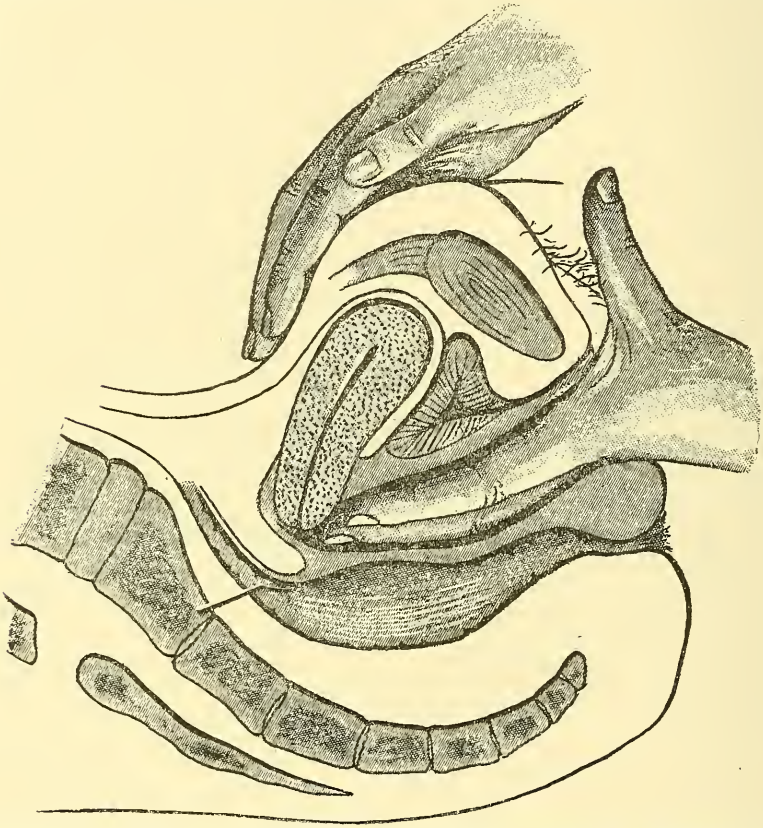

Fig. 232.—Bimanual Reduction of a Retroversion or Flexion. Second Step. Placing the reduced uterus in a position of anteversion.

pose the reduction. He describes minutely the method of freeing the uterus from pseudo-ligaments and adhesions which fix it behind or laterally or on its surface to the rectum. Under anæsthesia he claims that he can feel the ovaries and destroy their adhesions. This bold practice has found imitators, but it has also been condemned (Schröder). It is true that Schultze has obtained very remarkable success in this way, but if the tubes should be inflamed, the method, it seems to me, would be very dangerous.

3. *Reduction by the Sound.*—This is the method which is generally employed, and which even Schultze advises whenever it is necessary to overcome resistance of unusual degree. Either the genu-pectoral or Sims' position may be adopted. A large smooth metallic sound is selected and introduced many times consecutively to reduce the deformity to a retroversion; then the sound is made to describe an arc of a circle, and the beak of the instrument within the uterine

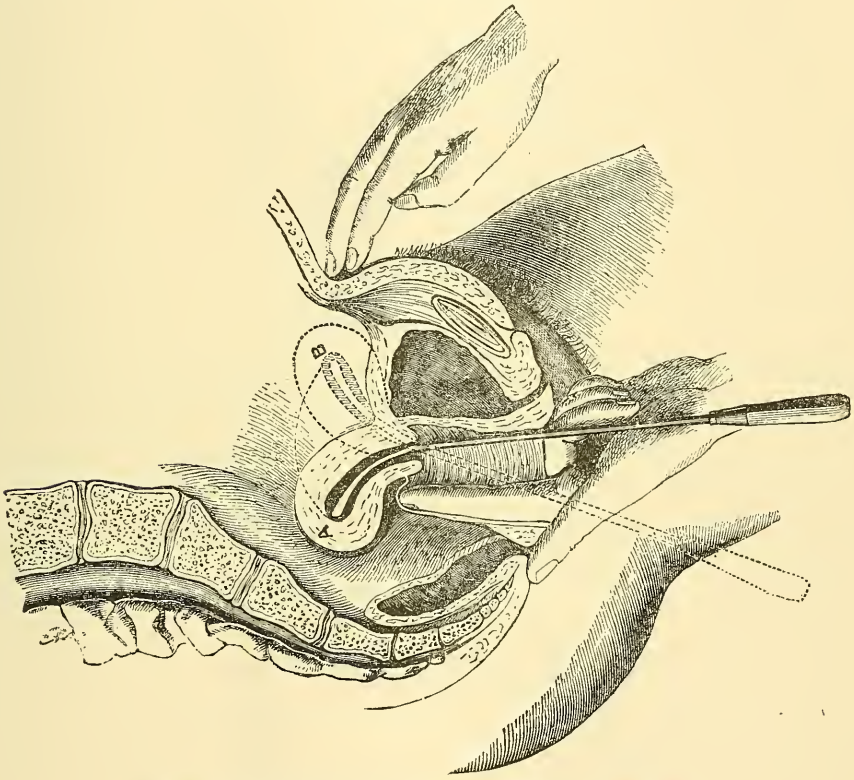

Fig. 233.—Replacement of a Retroflexed Uterus by the Sound.

cavity performs a rotation which carries its concavity forward. The uterus is thus straightened but is still in the retro-position; to bring it forward, the handle of the sound is depressed toward the fourchette (Fig. 233).

In all these manœuvres no sudden rough movements should be performed, but the pressure should be gentle and continuous. It is well to precede the reposition of the organ by dilatation with laminaria tents, which gives suppleness to the tissues, and the mucous

membrane which is so often diseased at the isthmus should be curetted; the reduction may then be completed in one session. At other times it is of advantage to divide the treatment over several sittings, repeating them every two or three days: after each one the amount

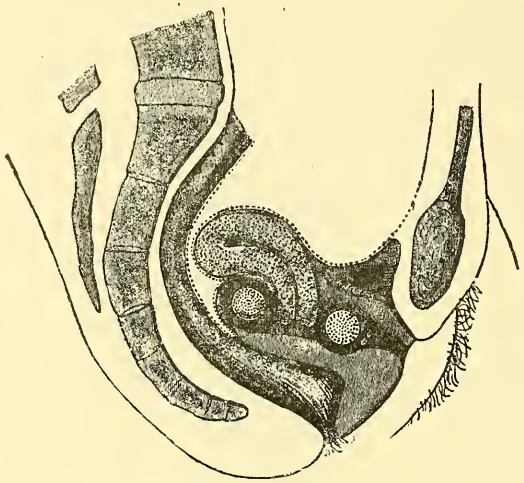

Fig. 234.—Annular Pessary of Dumontpallier in Place, in a Case of Retroflexion Which it is Changing to Retroversion; Reduction may Follow Spontaneously.

of improvement obtained may be preserved by carefully filling the posterior vaginal pouch with iodoform gauze; finally the pessary may be introduced. The most simple instrument for reducing the uterus is the sound; I prefer it to all the various repositors which have been invented.[18]

Fig. 235.—Hodge Pessary with Anterior Depression to Avoid Compressing the Urethra.

[It is to be remembered that this method of instrumental reposition is only to be employed after a most careful examination has shown the probable absence of any recent parametritic trouble or of marked disease of the uterine appendages, and that in its employment the most scrupulous asepsis is to be maintained. With these precautions, and remembering that to avoid mechanical injury to the uterine tissue the

sound should be inserted only to within a quarter of an inch of the fundus and the finger tip in the vagina and not the cervix used as a fulcrum, the method is comparatively safe.]

Fixation of the Reduced Uterus.—For this purpose we may employ either prothetic measures (pessaries) or various operations.

Pessaries.—A simple tampon of cotton in the posterior pouch is a means of maintaining the uterus and is easily renewed, but it is bet-

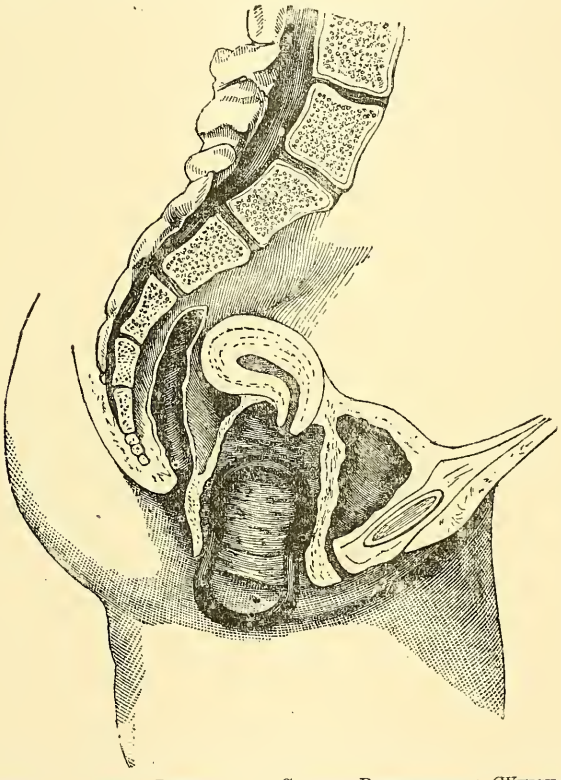

Fig. 236.—Introduction of a Hodge Pessary in a Case of Retroflexion (Which Should First be Reduced).

ter to employ an indifferent pessary, like Dumontpallier's ring, which has at times caused the reposition of the organ without the surgeon's efforts by the steady pressure which it exerts (Fig. 234). [Ring pessaries of either hard or soft rubber, while often effective, are objectionable because of the stretching of the vagina which they cause.] A better instrument is the Hodge pessary with a double curve (Figs. 235, 236, and 237).

The pessary should be chosen to fit each case. If too small it is of no value, if too large it becomes intolerable. If the perineum is resistant,

the pessary may be a little narrowed below (Albert Smith's); this would be an inconvenience in the contrary condition. It is well to have a small depression in the anterior portion to avoid injury to the urethra (Fig. 235). The most convenient kind of pessary is that formed of one thickness of strong copper wire and covered with rubber; they may be instantaneously modified, and yet they are resistant enough. As a matter of fact, the surgeon should know how to adapt his instrument to each case by giving more or less sweep to its curves. Hard-rubber pessaries are also very good, unalterable, and can be softened in hot water so that their form can be changed. In difficult cases I model a pessary of flexible tin, and when I am certain that it is

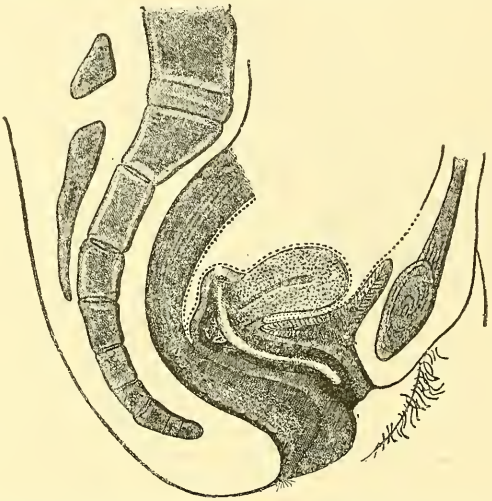

Fig. 237.—Hodge or Smith Pessary in Place after Reduction of Retrodeviation.

of the shape exactly adapted to the case I copy it in aluminum, which is both light and resistant, though the vaginal secretions alter it and it has to be frequently renewed. The lower extremity of a pessary should always rest a little above the meatus.

Gaillard Thomas has devised a pessary which resembles the Smith, except that it has its posterior bar thickened [and Mundé has still further modified this by making it shorter and broader (Fig. 239)].

The Hodge or Smith pessary should be introduced with the patient lying on the side; it is covered with vaselin and presented at the vulva in such a manner that it shall glide flatwise along one of the lateral vaginal walls. While the labia are separated, the perineum is strongly depressed (Fig. 236); then when the pessary has passed the introitus,

it is easily turned about in the larger superior portion of the canal. It then glides upward and backward, describing a spiral along the posterior wall. A slight pressure on its posterior bar carries it beyond the cervix into the posterior vaginal pouch and it thus occupies an oblique position from above downward and from behind forward. The abdominal pressure acting upon the pelvic floor, constantly but with increased force in all efforts, tends to make the pessary take a horizontal position, and it thus oscillates about an imaginary axis which passes through the middle of its transverse diameter, so that while the inferior arc is depressed the superior is lifted, owing to the obliquity of the wall. The posterior cul-de-sac is therefore stretched, the cervix drawn backward according to the degree of the abdominal pressure, and the uterus as a whole carried forward if the retroflexion has been reduced previously. It is not unimportant to remark that, even when this reduction has been incomplete, some benefit may often be obtained

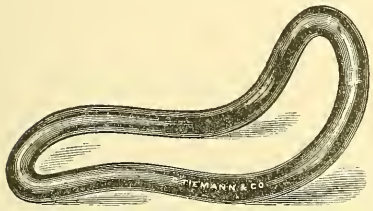

FIG. 238.—ALBERT SMITH PESSARY FOR RETROVERSION.

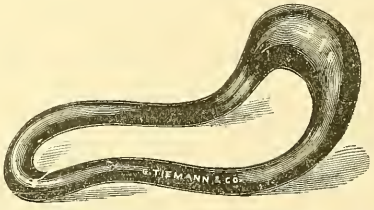

FIG. 239.—MUNDÉ PESSARY WITH THICKENED POSTERIOR BAR FOR USE IN RETROFLEXION.

by either the ring or the Hodge pessary; the instrument then acting simply by diminishing the mobility of the uterus.

The cradle pessary with a simple curve, much recommended by Olshausen and Schröder,[19] has the advantage of not descending so far as the Hodge and also of sustaining the anterior vaginal wall, but it is not so powerful as the doubly curved lever form (Figs. 238 and 240); it is specially adapted to cases where there is some relaxation of the anterior wall.

If the patient takes a douche twice a day, the pessary may be left in place for two or three months; at the end of this time it should be withdrawn and careful account taken of the position of the uterus; if it remains in the position of anteversion, the pessary is given up, otherwise its use must be continued. The accidents which have been described as the effect of forgotten pessaries are due to their complete neglect for years, with no attempt toward cleanliness.

[The Albert Smith type of pessary, both with and without the

thickened posterior bar, is the most generally useful, and it is seldom that any other form will be required in the treatment of retro-displacements. This is employed with a posterior bar having a gentle sweep in simple retroversion, and with a more pronounced curve, up to 90°, when a flexion is to be overcome.

It is to be remembered that this pessary does not act by a general over-distention of the vagina, but by pushing up the posterior cul-de-sac and thus drawing the cervix backward and upward. When properly fitted, it should cause no pain, should not project from the vagina or be felt by the patient, should be movable and small enough so that the finger can be swept between it and the vagina at every accessible

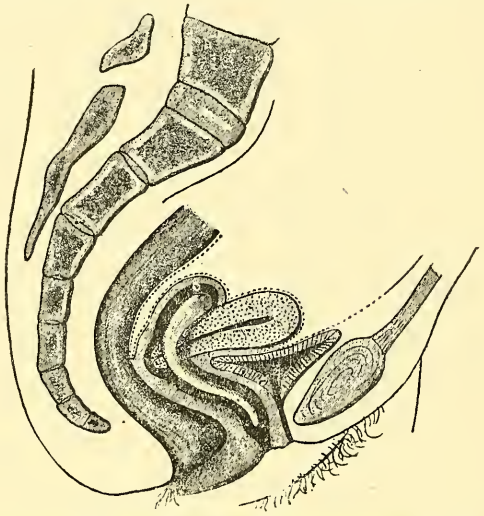

Fig. 240.—Mundé-Thomas' Pessary in Place after Reduction of a Retrodeviation.

point without tension. It should never be introduced until the uterus has been replaced, never when there is any marked tenderness or inflammation present in any part of the pelvis. The patient must always be told that she is wearing a pessary, and that she must remove it by hooking her finger over the anterior bar and pulling downward if it causes pain at any time. She must keep the parts clean by a daily cleansing warm injection, with a little soda bicarbonate added. Injections of alum or any sulphate are to be avoided, as they soon cause the pessary to become roughened by incrustations. The pessary should be removed at least once in three months, to be cleaned and polished. So far, no better material has been found than polished hard-rubber of good quality. While it is truly said that very few permanent cures result from the use of these instruments, they are most

valuable as a palliative and adjunct to other treatment, and when properly and intelligently used do not cause harm.

A properly fitting bar pessary does not interfere with coitus or impregnation; and should the latter occur the pessary should be worn

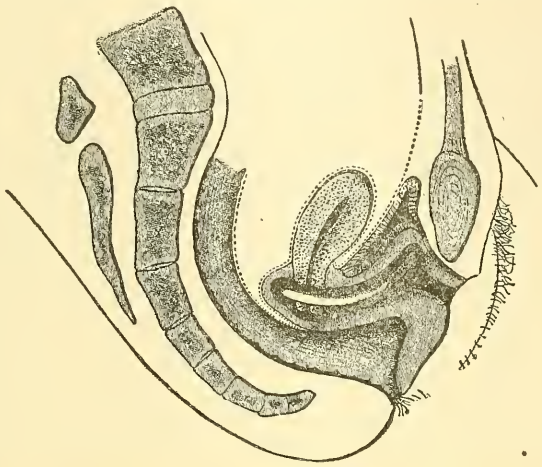

FIG. 241.—CRADLE PESSARY IN PLACE AFTER REDUCTION OF A RETRODEVIATION.

until the uterus has become so large that there is no longer danger of its possible retroversion and incarceration.]

The preceding pessaries act indirectly upon the cervix by the tension of adjacent parts; other forms of the instrument have a direct action upon the organ. Schultze uses pessaries of the form of the

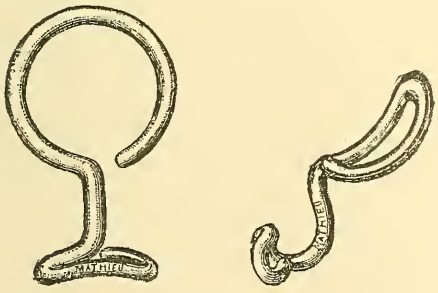

FIG. 242.—LANDOWSKI'S PESSARIES.

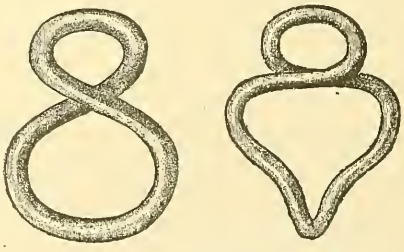

FIG. 243.—SCHULTZE'S FIGURE-OF-EIGHT PESSARY.

numeral 8, which encircle the cervix and lift it backward; they are made of copper covered with rubber. An instrument is chosen whose upper curves embrace the cervix without strangling it, and the lower ring is adapted to the size of the vagina and the angle of the pubic arch. These pessaries are best for nulliparæ, in whom the vagina

is resistant and there is no need of seeking a point of support from the pubis; in the latter case they are intolerable (Figs. 243, 244).

Landowski's ingenious pessaries resemble those of Schultze; they are made of flexible tin, and the T-shaped stem may be put in one direction or the other according as we wish to employ it for anteversion or retroversion (Fig. 242). In the latter case the stem is bent from behind forward and the anterior vaginal wall is in relation with its concavity; this stem abuts against the pubes, embracing with its recurved extremity the fleshy band which always exists behind the symphysis, but whose thickness differs in different subjects; the ring surrounds the cervix. Before it is applied we should assure ourselves

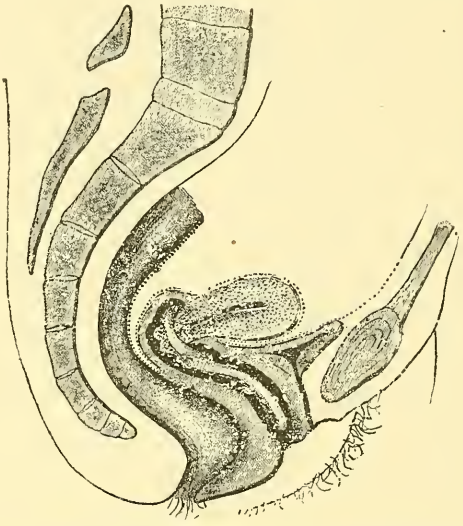

Fig. 244.—Schultze's Figure-of-Eight Pessary in Place after the Reduction of a Retrodeviation.

by palpation through the rectum that the fundus is reduced; then, with the pessary in place, the patient must be made to walk, sit, lie down, etc., to determine whether she is incommoded by it; if she is, we employ a smaller size. When the flexible pessary is well supported, we may substitute for it a rigid one in aluminum. When the perineum is very flaccid and the vagina large and relaxed, Schultze employs a pessary with a cervical rest (Fig. 245), which resembles the instrument proposed lately by Vulliet. Fritsch [20] combines Schultze's pessary with the Hodge made of hard-rubber, especially in the first days after reduction, following it with a Hodge pessary strongly curved (Fig. 246). All these pessaries are best inserted in Sims' position (lateral semiprone).

Pessaries have been devised which have their point of support externally, like the hysterophores used in prolapse; they are all inconvenient and untrustworthy. [The Thomas-Cutter [21] is sometimes temporarily useful where the posterior vaginal cul-de-sac is too shallow to permit the use of an intra-vaginal pessary, its action tending to stretch and deepen this pouch.]

Pessaries with an intra-uterine stem may be of service in maintaining a reduction for a few days, especially as an auxiliary to other methods. Courty [22] replaces the uterus with the sound once or twice a week, introducing a galvanic uterine stem for a few hours after each session. Alexander also maintains the organ in anteversion with a stem pessary after shortening the round ligaments. These are the only advisable applications of these instruments in retroflexion.

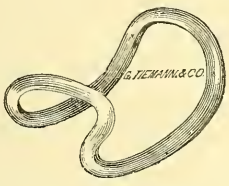

Fig. 245.—Schultze's Pessary with Cervical Rest, or Sleigh Pessary.

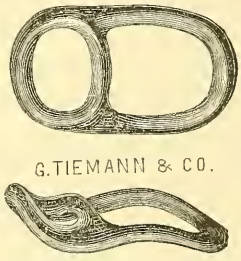

Fig. 246.—Fritsch's Pessary.

Whatever the form adopted, there are many cases where it is absolutely impossible to maintain the reduction. Sänger,[23] from careful statistics of 57 cases treated by pessaries in his practice, obtained but 7 cures, or 10.6%; 27 were improved, or 40.9%; in 15 cases there was no result (24.7%) beyond moderation of the subjective symptoms.

The causes of failure with pessaries may be either extreme mobility of the uterus or relaxation of the vagina and perineum; in the latter condition they may be combined with the use of a perineal cushion, which often affords much relief. If there is at the same time procidentia uteri or vaginæ, plastic operations are of great service in providing a point of support for the pessary.

Patients are always relieved, especially when the abdomen is very large, by an abdominal supporter which takes off the weight of the viscera.

Whatever the prothetic measures adopted, there are many patients who cannot be cured by them; in such cases we must have recourse

to operation. There are two of these which merit special mention, viz., shortening the round ligaments and abdominal hysteropexy.

The Operation of Alquié-Alexander-Adams.—The idea of restoring or elevating the uterus by shortening the round ligaments, which are easily accessible to the surgeon at their termination, belongs to Alquié,[24] of Montpellier. Two English surgeons reinvented the operation and performed it at about the same time, and it is only just to connect their names with that of our compatriot.

The operation is performed to maintain the reduction in retroflexion and for prolapse; I will return to it in considering the latter subject. It was very coldly received in England,[25] Germany,[26] and France.[27] It was asserted, after insufficient and unfortunate investigation, that the round ligaments were not to be found outside the inguinal ring. A reaction then followed and the operation to-day has many partisans, although its precise indications and its advantages are far from being correctly appreciated.

In my description of the technique I base my remarks on Alexander's paper and on my own experience.[28] The operation should always be preceded by curettage as a preliminary step.

First and Second Steps—Discovery of the Ligaments.—Having found the pubic spine, an inch-and-a-half incision is made over it in the line of the inguinal canal down to the muscles. With the finger the non-resistant point of the external inguinal ring is found and laid bare, avoiding the intercolumnar fibres which limit the ring above and externally. The cellular layer which stretches between the pillars of the ring is then cut and a cushion of fine yellow fat, upon which Imlach[29] insists, pouts out of the wound. The genital branch of the genito-crural nerve is then drawn aside, and with a grooved director the round ligament is sought. It may be recognized by its reddish cord-like aspect, a little striped at its lower extremity (Fig. 247); it is then seized with forceps and isolated with a blunt instrument. The wound is then covered with an antiseptic pad and the same manœuvre repeated on the other side.

[The ligament is more easily found toward the upper limit of the external ring. If a nick is made in the intercolumnar fascia and the opening made to gape by drawing it back with a strabismus hook, while another is passed down on the outside of the grayish mass seen through the opening and its point turned inward, a mass of tissue is easily secured which when freed from the accompanying nerve is easily recognized as the round ligament. Fibres are found which do

not draw on the borders of the ring, and by steady traction on these the glistening, smooth cord of the ligament emerges.]

Third Step—Reposition of the Uterus.—Alexander prefers to replace the uterus with a sound which an assistant passes into the organ, aiding the reduction by means of bimanual palpation, while the surgeon uncovers the wounds, seizes the ligaments, and isolates them with the spatula or by cutting the fibrous bands which hold them with the scissors. They are drawn out a distance of about ten centimetres. Four or five centimetres, which some operators[30] have considered enough, does not accomplish a satisfactory reduction. To avoid wounding the serous membrane, Duplay[31] has proposed to put a ligature

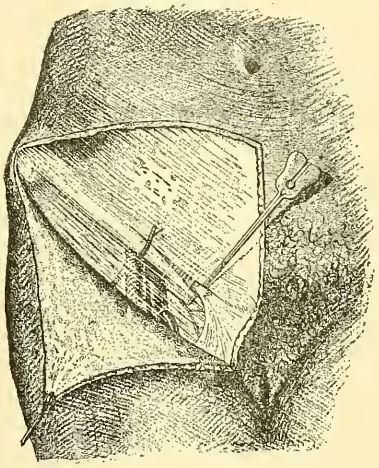

Fig. 247.—The Round Ligament at the External Abdominal Ring.

round that portion of the ligament which is farthest up the canal; thus if the infundibuliform process of the peritoneum has been drawn down, it is tied off by the ligature. I do not practise this manœuvre.

The two ligaments must be treated with the same traction and they should come with but little force, especially when the assistant aids the reduction by the sound; this easy extraction need not cause any fear that they have been torn within the abdomen. Resistance is felt when the uterus is replaced, and movements of the sound in the organ will be transmitted to the ligaments.

Fourth Step—Suture of the Shortened Ligaments; Closure of the Wound.—The surgeon confides to an assistant the charge of keeping the ligaments moderately tense while he prepares to suture them. A curved needle with silk is passed through the external pillar and the ligament toward its upper border and lastly through the internal

pillar, so that the stump of the ligament is firmly united to the margin of the external orifice of the inguinal canal. A second suture is passed through the lower portion of the ligament; then all that part of the fibrous cord which is beyond these sutures is cut off. If it has been necessary to open the canal and divide the intercolumnar fascia, the incision should be closed with catgut; even when these parts have not been cut, I am accustomed to close the ring by a deep catgut suture, which thus forms the lowest of the different planes of superimposed sutures which I employ for the closure of the wound. It is useless to drain if the wound is clean and the search for the ligament has not been difficult. Antiseptic dressing, with slight compression.

Casati,[32] of Rome, has proposed a modification of the technique, making a curved incision from one ring to the other, crossing the extremities of the excised ligaments, and fixing them with a deep, continuous catgut suture. Doléris,[33] in cases where the ligaments are thin, adopts a procedure similar to the above, with the difference that the crossing and suturing of the ligaments is made under the skin and not exposed. The free end of the right ligament cut at its pubic insertion is seized by forceps introduced from the opposite side, and carried under the skin above the pubes to meet the end of the other. The left ligament is sutured to its pillars, the free portion is resected, and its free extremity placed in contact with that of the opposite ligament, the two trunks are freshened and sutured with catgut; drainage. Segond[34] fastens the round ligament in the superior angle of the ring by a suture of silk; then, in the middle of the two pillars on their free borders and parallel to them, he makes a short incision like that which Reverdin has advised in the radical operation for hernia; he thus obtains two small button-holes which he uses in tying the ligament round the pillars. Seizing the end of the ligament, it is passed from behind forward through one of the openings, then through the other from before backward, and finally made to emerge in the superior angle of the ring, which thus forms an actual knot and is then fastened with one or two sutures which diminish the ring and give more solidity to the fixation of the ligament. I consider the procedure which I have given more simple and equally effectual.

Fifth Step.—Alexander considers it of great importance to maintain the uterus in a good position during convalescence, with a stem pessary to keep it straight and a Hodge to insure anteversion. The

ligaments are thus relieved from the traction which the uterus does not fail to exert upon them by its tendency to reproduce the displacement. The pessary should be retained during the first month, which the patient spends in bed [and for several months after]. I have abandoned the stem, but it is well, I think, to maintain the uterus and thus relieve the ligaments either with the Hodge or by means of antiseptic tampons frequently renewed.

Gravity of the Operation; Results; Indications.—At the end of the work which I have cited, Alexander mentions twenty-six cases of retroversion and retroflexion upon which he had operated up to June, 1885, with permanent success. It is evidently, then, a benign operation. But Alexander states that death may occur in exceptional circumstances, as after every surgical procedure, however small, having known three cases, in his own experience, from pyæmia due to contagion. Many cases have been recently published in France and elsewhere by Trélat, Doléris, Schwartz, Terrillon,[35] who have obtained great advantages from the operation in retroflexions which were easily reduced, with no accidents. Fatal cases have been described by foreign writers, Harrington[36] having collected 140 cases, with 3 deaths, from 21 operators. The operation is now generalized and is practised everywhere,[37] with variable success, which appears to depend upon the degree of clearness with which the indications are appreciated. Besides the important discussions at the Paris Surgical Society, I would mention those of the Congress of Gynæcology at Munich,[38] and at the Congress at Halle.[39]

It seems, then, that the operation of Alquié-Alexander is susceptible of giving excellent and permanent results in retroflexions of the uterus. In simple cases a pessary may be preferable; but where it is difficult to apply, and is not well borne, shortening of the round ligaments is a valuable resource; we should thus be able to cure even bedridden patients; but it is well to know that cases which are rebellious to the pessary sometimes bring disappointment, even after operation; Küstner[40] and Keith[41] have published instructive cases of this variety.

Trélat[42] has performed Alexander's operation forty times, of which five were for movable or adherent retroversion, which were previously reduced in repeated sessions, and obtained excellent results. He clearly formulates the rule that shortening of the round ligaments seems to be the operation directly indicated to maintain in anteversion a uterus which was previously fixed by adhesions in retroflexions, mobilized by treatment, but unable to preserve the position

itself or by pessary. Moreover, since retrodeviations seemed to him to constitute an actual menace to the patient, in view of the almost constant complication of metritis and salpingitis provoking adhesions, he considered it good practice to intervene in retroversions which were absolutely indolent, and thus to guard against possible accidents. This principle seems to me to extend the field of operation far too widely. I am inclined rather to accept Mundé's [43] advice, who, although a great partisan of the operation, reserves it for painful deviations which are easily reducible.

[Nearly all [44] those who have had practical experience with Alexander's operation have declared in its favor, and it will undoubtedly continue to be done successfully in properly selected cases and with accessory operations for lessening the weight of the uterus, narrowing the vaginal walls, and repairing the torn perineum.[45]

The greatest value of the operation is in old cases of retroversion and flexion, especially when associated with descent or prolapse and with more or less anterior or posterior colpocele; that is, when the plevic floor is injured beyond non-operative restoration. To these indications may be added (Kellogg) displacement accompanied by prolapse of the ovaries, so that the wearing of a pessary is not practicable. The presence of adhesions is an absolute contra-indication, except where they can be broken by gentle manipulation. When Alexander's operation is contra-indicated or inefficient, other methods are to be employed. These fall into two distinct categories, one utilizing the natural supports, the other creating new supports and each having its own sphere of usefulness.]

Colpo-hysteropexy and Vaginal Hysteropexy.—The first attempts to fix the uterus by way of the vagina, after it had been reduced to a good position, date from the time of Amussat,[46] who, in case of version, either forward or backward, employed the hot iron and cauterized the side opposite to the displacement to produce a cicatricial bridle which would restore the organ. Courty [47] claimed to have obtained very good results from this singular treatment in cases of anteversion, and, although he did not reject it in retroversion, declared that there was here some danger to the adjacent peritoneum.

With the same object a transverse fold of the vagina has been sutured in such a way as to shorten one or the other wall of the canal; Sims performed this three times for anteversion.

Richelot, Sr.,[48] has proposed to consolidate the cervix with the posterior wall of the vagina, and Byford [49] has performed an analo-

gous metro-elytrorrhaphy in patients who had passed the menopause, uniting the anterior vaginal wall on the anterior surface of the cervix with the posterior wall of the vagina. Doléris[50] practised pre- or retro-cervical colporrhaphy in similar cases, after having reduced the displacement.

When the anterior vaginal wall appears too short, Skutsch[51] proposes to lengthen it by a transverse incision, which is then sutured longitudinally.

Schücking[52] fixes the fundus of the uterus to the vesico-uterine cul-de-sac by means of a double-threaded, strongly-curved needle

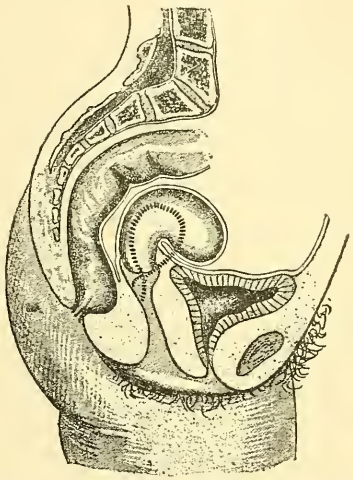

FIG. 248.—VAGINAL HYSTEROPEXY. SCHUCKING'S OPERATION.

cachée, introduced into the replaced and dilated uterus, with which he pierces the vaginal fundus and vaginal pouch below the bladder, tying the suture so as to have the uterus in an exaggerated position of anteflexion. The suture is removed from the tenth to the fourteenth day, when the exaggerated anteflexion disappears. In spite of reported successes, this adventurous procedure does not seem to me worthy of recommendation.

Von Rabenau[53] has proposed to incise the cervix, then to open the anterior vaginal pouch and separate the bladder from the uterus by a dull instrument; the anterior wall of the uterus is then excised for a distance of four centimetres and the wound sutured. This operation has been imitated by Schmidt,[54] of Cologne. Fraenkel[55] has justly observed that the cervix is so strongly drawn forward by the cicatricial process that the body of the uterus tends to fall backward.

Sänger[56] has theoretically adopted the idea of Schücking, but his operation of suturing the fundus to the anterior vaginal cul-de-sac is different. After transverse section of the anterior cul-de-sac of the vagina and of the peritoneum behind the bladder, he sutures the uterine body to the vagina with silver, uniting the vaginal wound on a vertical line to elongate the anterior wall of the canal and permit the cervix to retire backward.

It is probable that both the attempt and the realization of this ingenious hypothesis is still far distant.

Richelot[57] has warmly recommended a procedure of Nicoletis for the purpose of elevating the uterus, which takes its point of support upon the posterior vaginal wall and peritoneum. The intra-vaginal portion of the cervix is first amputated, then on its posterior aspect three catgut ligatures are passed through the uterine stump and vagina in such a way that they reappear at the internal uterine os. These three threads are median; to the right and left two others are passed, taking in the posterior wall of the vagina and emerging on the anterior border of the stump so that the posterior vaginal wall is thus suspended from this border of the uterine section; coaptation is completed by superficial sutures. The entire vaginal insertion is carried forward, and the wall drags upon the fundus of the uterus and rotates it forward even at the moment of operation (Fig. 248). This, I think, is to expect a mechanical effect to be permanent, which is really only an illusion, for the constant extensibility of the vagina and the frequent flaccidity of the perineum reduce the procedure to an ingenious theoretic conception. The good results obtained have been due only to cervical amputation and its effect upon the metritis.[58-60]

Pelvic Colpo-hysteropexy.—This is the name which might be given to the operation of Freund[61] in cases of prolapse or serious retroflexion with a largely developed Douglas' pouch. He thinks that both of these displacements may be due to persistence of the great extent of this cul-de-sac in the fœtus, for up to the seventh month of intra-uterine life the peritoneum descends to the middle of the vagina. Freund made a large opening in the posterior vaginal pouch, entered the peritoneum, and sutured the posterior surface of the supra-vaginal portion of the cervix to the serous membrane above the promontory near the utero-sacral ligaments, taking care not to wound the rectum; then he packed the cavity with iodoform gauze and partly closed the vaginal wound; afterward he restored the perineum if it was neces-

sary. It does not seem that this operation is more benign or more efficacious than abdominal hysteropexy.

The germ of Freund's conception was found in the propositions of Schultze and Sänger. Schultze [62] proposed a transverse section of the posterior cul-de-sac of the vagina, freeing uterus and adnexa, reposition of uterus, and obliteration of Douglas' pouch by sutures in such a way that the cervix would be drawn backward. Sänger [63] inquired whether curative adhesions could be produced by opening the recto-uterine pouch and tamponing with iodoform gauze. Freund

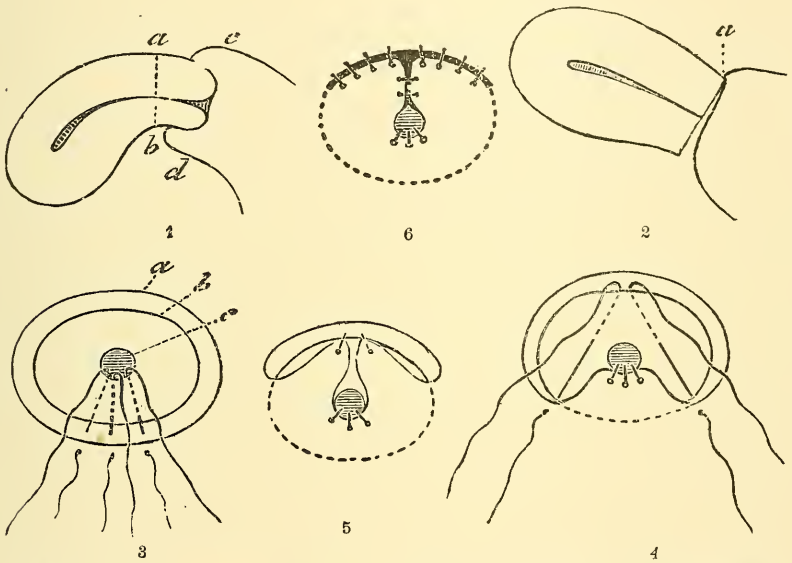

FIG. 249.—VAGINAL HYSTEROPEXY; NICOLETIS. 1. Retroverted uterus; *a*, *b*, line of section; *c*, *d*, vaginal walls. 2. Uterus replaced; *a*, insertion of the two vaginal walls upon the anterior surface of the stump. 3. Front view of the uterine stump after supra-vaginal amputation; passage of the three median threads; *a*, vaginal wall; *b*, anterior edge of stump; *c*, uterine orifice. 4. Fixation of the posterior vaginal wall to the uterine orifice; passage of the two lateral threads. 5. Fixation of the posterior vaginal wall to anterior border of the stump. 6. Suture complete.

thought of alcohol injections in the neighborhood of the utero-sacral ligaments and into the retro-cervical cellular tissue, in the hope of thus producing anteversion by the contraction of these ligaments. This was assuredly a great risk, exposing the parts to inflammation which would exceed therapeutic limits.

Most of these procedures of vaginal hysteropexy are open to two objections—they act directly upon the fundus, and fix the uterus to tissues which are movable and extensible, which is not the case in suture of the uterus to the abdominal wall.

Gastro-hysteropexy or Fixation to the Abdominal Wall (ventrofixation, gastro-hysterorrhaphy, gastro-hysterosynaphy):

Historical Review.—When the pedicle of an ovarian cyst has been fixed in the abdominal wound, it is quite common to find that a previous uterine displacement has disappeared. From this originated the idea of purposely fixing the uterus to the abdominal wall by means of the broad ligaments, with or without removal of the ovaries. The first operation of this kind was performed by Kœberlé.[64] On March 27th, 1869, in a difficult case of retroflexion which had caused symptoms of chronic intestinal obstruction, he incised the abdominal walls, brought the uterus forward, removed a healthy ovary, and sutured the pedicle to the lower border of the wound. Sims[65] (February 22d, 1875) performed laparatomy on a woman of thirty-two years who suffered from an extremely painful retroflexion, removed the left ovary, which was of the size of a nut and in cystic degeneration, and sutured the pedicle in the lower angle of the wound in such a way that the uterus was held in its normal position; the patient was perfectly cured. Schröder,[66] a little later, had a patient who suffered from retroflexion and choreic symptoms, and also had a small cyst of the ovary, upon whom he performed laparatomy and fixed the pedicle to the abdomen, curing the displacement and the chorea. Lawson Tait,[67] on February 20th, 1880, practised laparatomy for oöphoritis and retroflexion upon a woman whom nothing had benefited. He found the ovaries large and soft but not cystic, and removed them; then on closing the abdominal wound he passed a suture through the fundus and fastened the uterus to the wall. A second operation was done April 9th, 1880. Both cases remained cured in 1883. Hennig[68] in 1881, in a case of rebellious retroflexion, performed castration and sutured the ovarian ligament on the right side and the broad ligament on the left into the abdominal wound.

After these scattered cases without definite system, Olshausen,[69] in an article which was the beginning of a new era, published an improved method including three remarkable cases, one of retroflexion and two of prolapse. He united with many sutures of silkworm gut that portion of both round and broad ligaments which is adjacent to the uterine cornua with the abdominal wall, taking great care to avoid the epigastric artery. In one case he extirpated the ovaries in a patient who was near the menopause, but remarks that this contingent to the operation was purely accidental.

At the congress where Olshausen's communication was made, a

memoir of Fraenkel's was followed by a discussion,[70] and a number of new cases were cited by Bardenheuer (reported by Frank) and Czerny. Soon afterward Kelly,[71] in Philadelphia, published an interesting case of retroflexion cured by ablation of one ovary and fixation of the pedicle to the abdomen, together with a partial analysis of preceding papers; the other ovary had been extirpated some time before by the vagina. Kelly published at the same time two cases of castration and suture of the broad ligaments to the abdomen by Sänger. Soon after the latter author prepared a more complete study of the subject with 7 personal cases.[72] Klotz,[73] in October, 1887, had already reported to the Gynæcological Society of Dresden 17 cases of fixation of a retroflexed uterus to the abdominal wall by means of a pedicle formed of the tube. Leopold,[74] one month later, presented 3 successful cases after fixation of the fundus in the abdominal wound. In 1888 Kelly,[75] in America, published a new paper on the subject with several new cases; 4 of P. Zweifel's for retroflexion (hysterorrhaphy without castration) and 1 of Staude's for retroflexion (hysterorrhaphy with ablation of one ovary, the other being so adherent that it could not be extirpated).[76] Phillips[77] published 1 case of ventro-fixation for prolapse in England. Schauta has reported 4 cases from his practice.[78] Czerny[79] has given 4 cases of gastro-hysteropexy and described his method in an important memoir which appeared in October, 1888. In France, Terrier, and Picqué were the first to perform the operation, Terrier in August, 1888, for prolapse, and Picqué in September for retroflexion.[80] Since that time the cases have multiplied in France and elsewhere, and their description offers nothing peculiar.[81]

It is probable that many gynæcologists have practised occasional complementary fixation of the uterus after ablation of an ovarian cyst or a fibroma or to remedy a retroflexion or a prolapse, without publishing: thus, in April, 1882, I fixed the pedicle of an ovarian cyst and cured a prolapse. The case was mentioned for the first time at a discussion on hysteropexy and published entire by Dumoret.[82] Czerny[83] practised an analogous suture of the pedicle of the ovary for retroflexion June 15th, 1886, but did not publish the case till the year 1888. At that time he had done the complementary operation three or four times in forty-six ovariotomies.

With these complementary hysteropexies it is convenient to include necessary fixation of the pedicle after supra-vaginal amputation[84] and fixation of the uterus after extirpation of a subperitoneal

fibroma.[85] Brennecke, of Magdeburg, has sutured the uterine cornu of the right side to the abdomen in the course of an ovariotomy to remedy a prolapse; success; 1883. In a second operation of ovariotomy

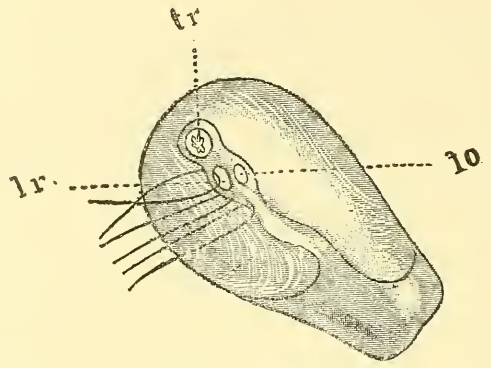

FIG. 250.—GASTRO-HYSTEROPEXY (OLSHAUSEN AND SAENGER). Profile view to show the path of the sutures. *tr*, Tube; *lr*, round ligament; *lo*, ovarian ligament.

he sutured both cornua for prolapse; failure; new operation on the same patient; suture of ovarian pedicle; 1885. With the exception, perhaps, of this last case, these operations have nothing in common with hysteropexies deliberately proposed. Werth, of Kiel, performed

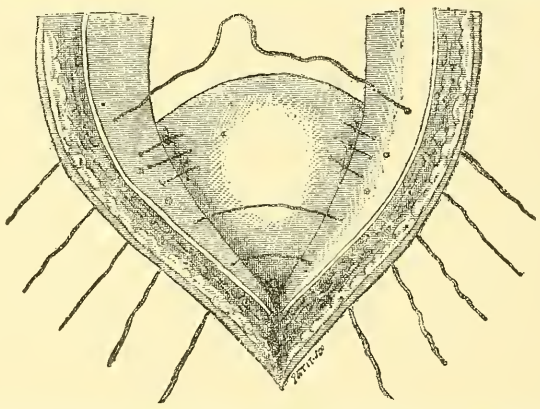

FIG. 251.—GASTRO-HYSTEROPEXY (OLSHAUSEN AND SAENGER) Front view. Two of the sutures for closing the abdominal wall are represented as cut away so as to show clearly the uterine sutures on either side which have already been tied.

castration for hemorrhage in 1887, sutured the pedicle to the wall, with cure at the same time of extreme retroflexion. In 1884, in another operation for dermoid cyst, he sutured the retroflexed uterus to the vesical peritoneum with silk; this is not ventro-, but vesico-hysteropexy, or cysto-hysteropexy. A case of Weist's, cited by Kelly,

where he was said to have attached the ovarian pedicle to the abdomen for prolapse, belongs in the class of fortuitous operations and is very different from veritable gastro-hysteropexy.

Operative Technique.—Three chief and several secondary procedures may be distinguished:

1. *Indirect Fixation* (Kœberlé, Klotz).—The ovary or tube being first removed, the pedicle is fixed in the abdominal wound. Klotz attaches much importance to the use of a glass tube behind the uterus in Douglas' pouch, which may be withdrawn after a short time, and which has for its purpose the production of adhesions. This method has the defect that it sacrifices the ovary, twists the uterus, and produces only a temporary union; it has often failed.[86]

2. *Direct Lateral Fixation of the Fundus* (Olshausen, Sänger).—Silkworm gut sutures are placed on each side, at the edges of the fundus, as shown in Figs. 250 and 251. They are inserted with care to include only the anterior serous layer and not to pierce the tube or the epigastric artery. This procedure has the disadvantage of leaving a cleft or button-hole between the uterus and the abdominal wall which may cause internal strangulation. Kelly's[87] method resembles Olshausen's and does not need special description.

3. *Direct Median Fixation* (Leopold, Czerny, etc.).—Leopold also fixes the fundus of the uterus to the abdominal wall. The abdomen is opened, the uterus replaced after rupture of adhesions, and then a strong needle, armed with silk, is passed from before backward, a little outside of the border of the wound, through the whole abdominal wall at the level of the fundus. The uterine tissue is pierced on the elevated surface of the anterior aspect of the organ in a line with the insertion of the two round ligaments. The needle is passed under the serous membrane and the superficial layer of the muscle for a distance of one centimetre, and then through the other lip of the wound, but this time from behind forward. A second suture is then inserted above in a line with the insertion of the tubes for about two centimetres, and a third a little above this one in the same manner (Fig. 252).

To facilitate the adhesion, Leopold gently scrapes the surface of the peritoneum with the back of the bistoury over that portion of the uterus which is circumscribed by the sutures, making a superficial freshening which does not bleed and simply removes the epithelium. Then he unites the lips of the abdominal wound at that level, tying the three sutures above the abdominal wall (Fig. 252) so that the anterior surface of the uterus is exactly applied to the parietal perito-

neum at this point. The rest of the wound is then closed below and above. The uterine sutures are removed at the end of about twelve days. None of the sutures are hidden. Leopold [88] thinks that he thus produces lax adhesions, with little risk to the bladder. It is well to insert a Hodge or Smith pessary for the first month to prevent strain on the sutures and maintain the good position gained.

Czerny [89] pierces the abdominal wall near the fundus with a very strong needle furnished with bichloride catgut (he first used chromic catgut). The needle passes through the muscles and the peritoneum and then the opposite side, but does not include the integument, which is a capital difference between this and Leopold's method. One

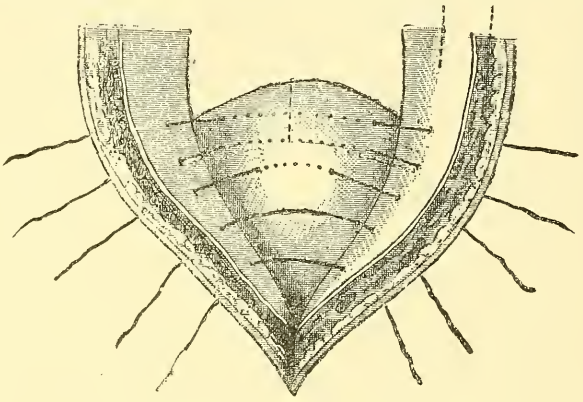

Fig. 252.—Gastro-hysteropexy; Leopold's Method.

or two threads are thus placed with care not to exert traction upon the uterus, a point being selected where the organ may be easily applied to the abdominal wall; they are then tied, the ends cut and the wound closed (Fig. 253).

Terrier's [90] procedure is a variation of the preceding. He begins by placing a provisional suture of silk in the fundus, through but little of the tissue, for the purpose of drawing the organ upward. Large catgut is used for the three permanent sutures, on the anterior surface of the uterus. The first is passed at the junction of cervix and body, the next at the middle of the body, and the last near the fundus. The threads pass through the superficial layers of the uterus, and the whole thickness of the abdominal wall, with the exception of the cellular tissue and the skin. This is the real difference between Leopold's and Terrier's procedures; the latter being distinguished from Czerny's by the care which is taken to pass the sutures like basting

stitches so that they are not wholly hidden in the tissues of the uterus but a portion is interposed between the organ and the abdominal wall; he thinks that the production of adhesions is thus better assured (Fig.

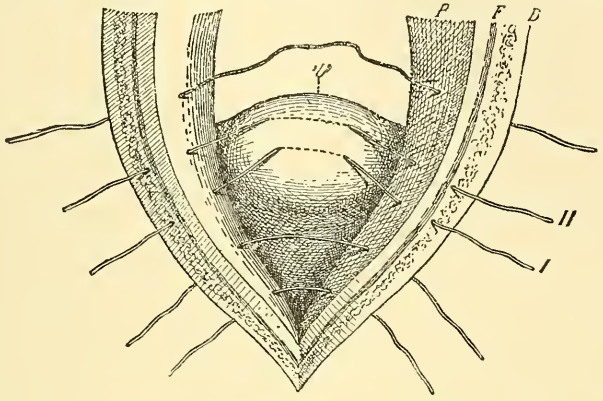

FIG. 253.—GASTRO-HYSTEROPEXY; CZERNY'S METHOD.

254). The threads are tied and form a "suture perdu," above which the integuments are brought together, superiorly by three silver sutures through the peritoneum and below by three strands of silkworm gut.

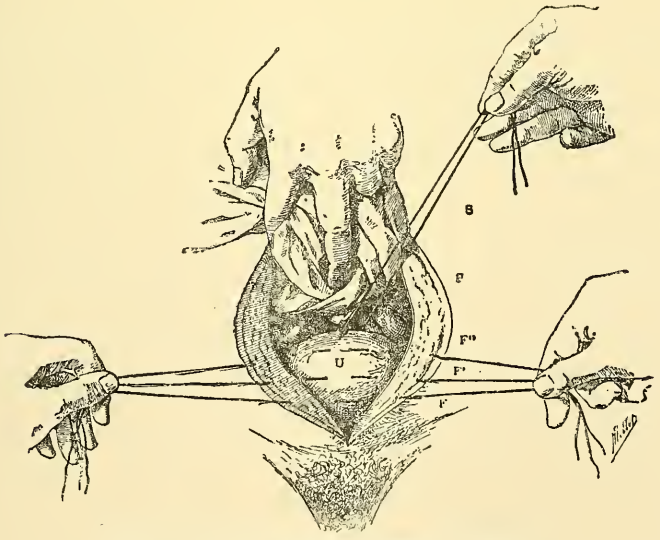

FIG. 254.—GASTRO-HYSTEROPEXY; TERRIER'S METHOD.

My own preference is for the continuous hem suture which I employ, no matter how great the extent of the wound. The following is the simple technique of the operation:

First Step.—Incision of the abdominal wall in the median line for eight centimetres, beginning a finger's breadth above the pubes.

Second Step.—Introduction of the index and middle fingers of the right hand into the wound, liberation of the uterus, which is then drawn forward, during which time an assistant raises the organ by his finger in the vagina.

Third Step.—Provisional fixation with a bullet forceps placed superficially in the fundus of the organ where the punctures do not cause hemorrhage, intrusted to an assistant who thus raises the uterus. The surgeon then takes a Hagedorn needle furnished with fine but strong

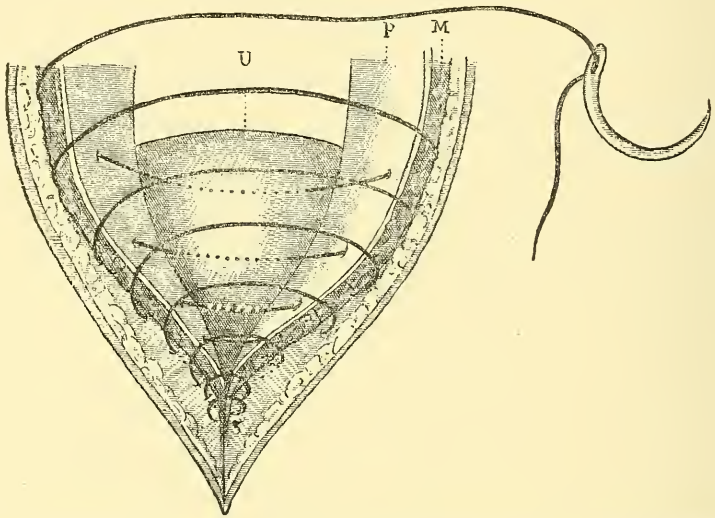

FIG. 255.—GASTRO-HYSTEROPEXY; POZZI'S METHOD. Fixation of the anterior face of the uterus with a hem stitch of silk.

silk, and passes two stitches through the lower part of the wound including the whole of the serous, fibrous, and muscular tissues of the abdominal walls in such a way as to establish there a point of support. Starting from this place he rapidly makes a spiral ascending hem stitch which includes all of the abdominal tissues except the skin and subcutaneous cellular layer, as well as the superficial portion of the uterus in the median line and then the opposite lip of the incision; three or four of these stitches are enough. As soon as the uterus is fixed to the abdominal wall, the silk suture is arrested (Fig. 255).

Fourth Step.—The remainder of the wound is closed by a hem of catgut on two planes (*étage*). Two sutures of silk bring together the skin and cellular tissue, accurate apposition being secured by a superficial hem of catgut.

On many secondary points of technique surgeons are not agreed. Should the suture be one which cannot be absorbed (silk or silkworm gut) as Leopold, Olshausen, Sänger, and Phillips propose, or silver as Olshausen advises for support in prolapse, or large catgut which is absorbed, as Terrier and Czerny suggest? Should we employ a Hodge pessary immediately after the operation (Leopold), tampon the vagina when the case is one of retroversion (Sänger), or keep the patient on a bed which is inclined toward the head to prevent intestinal pressure when the operation has been done for prolapse (Phillips)? These are points of detail which I will not discuss.

Prognosis of Gastro-hysteropexy.—The published results give but very few deaths.[91] The operation is not more fatal than an uncomplicated laparatomy. There is no doubt, however, that the prognosis may be aggravated by intra-abdominal laceration of great extent (as in a case of Klotz), when the uterus must be freed from strong adhesions, and in particular from adhesion of its surface to the rectum. It is only in these cases that drainage is indicated. Experience has proved that the bladder is not often involved and that there is seldom much urinary trouble. The results appear to be permanent. Leopold[92] has had cures lasting three years and Korn[93] sixteen months, in retroversions; but Olshausen has had one striking failure after ventro-fixation for prolapse. In one of Sänger's[94] patients three months after operation there was already a tendency toward return.

A question which it is very important to answer otherwise than by theoretical considerations is concerning the influence which pregnancy might have on a uterus sutured to the abdominal wall. Would the adhesion be ruptured? Would the course of the pregnancy be interfered with by the obstacle produced to its increase in size? or would such increase go on very easily above and outside of the small surface immobilized? One of the reasons why Olshausen, Sänger, etc., have adopted the suture of the uterus along its edges rather than on its anterior surface seems to be just this fear of obstructing the development of the organ during gestation. But their procedures assure insufficient adherence; and the cleft which Olshausen leaves between the bladder and the uterus, is, in spite of all precautions, a dangerous point for the production of internal strangulation. Experience has sustained some of the theoretic objections on this point. Sänger[95] performed hysteropexy on a woman who afterward became pregnant and at the end of six months had had but very slight pains; Routier[96] has safely delivered one of his patients without destruction

of the fixing adhesions; while Küstner[97] has described two abortions due to the operation.

Indications for Gastro-hysteropexy in Retroversion.—Should the operation be performed for cases where the uterus is movable, that is to say, the displacement reducible, trusting to the benign character of antiseptic laparatomy, when a properly selected pessary, with perseverance on the part of the physician and with patience on the part of the woman, has demonstrated that the case is not to be cured by the employment of such an instrument and that the symptoms persist? It seems to me, it should not be. Shortening of the round ligaments is too valuable[98] a resource to be neglected in such a case. In one instance Sänger attempted this operation before doing hysteropexy, but without success; but in another he decided upon the latter operation from the first without attempting to maintain the uterus by shortening the ligaments. The same is true of Leopold's first operation. This is an abuse against which we should protest. When two operations are likely to give the same result, the more dangerous should not be attempted before the safer has been tried in vain (*actum minoris periculi*). Now, in spite of the progress of abdominal surgery, no one pretends that opening the peritoneum and suturing the uterus does not endanger the patient's life more than a superficial incision and suture of the shortened ligaments. If I reject gastro-hysteropexy at the outset of the treatment as an exaggeration of its province, yet, when we have tried Alexander's operation without success, I think that the first operation is legitimate; it is more rational, more sure, and perhaps less dangerous than the vaginal methods of hysteropexy, and is preferable to vaginal extirpation of the organ.

The principal indication for abdominal hysteropexy seems then to be found in those cases of retroflexion which are irreducible, where there are adhesions which can be destroyed only under chloroform, which keep the fundus always in Douglas' pouch, except possibly after a false reduction where the uterus is replaced by drawing with it the anterior wall of the rectum. When, with the patient under an anæsthetic, we are convinced that the uterus cannot be reduced by the use of external means aided by the sound or the repositor within the organ; when, especially after dilatation, the finger in the uterus, as Schultze advises, is not able to effect the reduction—in such cases there are but two things to do; either abstain from new attempts to reduce the organ, which cause serious accident to the adnexa and the pelvic peritoneum, or, if the intensity of the symp-

toms demand it, perform laparatomy, liberate the uterus, and then fix it.

So far I have considered hysteropexy only as a principal procedure, decided upon from the outset as applicable to retroversion. If its advisability in this case is doubtful, the same is not true as regards its performance secondarily, as the complement of another

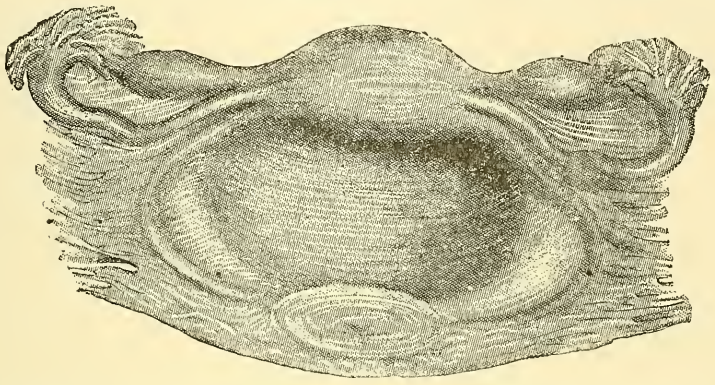

Fig. 256.—Course of the Round Ligaments as Seen Through the Transparent Peritoneum (Wylie).

operation. When, in the course of a laparatomy for another lesion, fibroma, ovarian cyst, inflammation of the adnexa, etc., the uterus is found to be displaced backward, as so often happens, the indication is to profit by the occasion and replace it. If there is a pedicle at

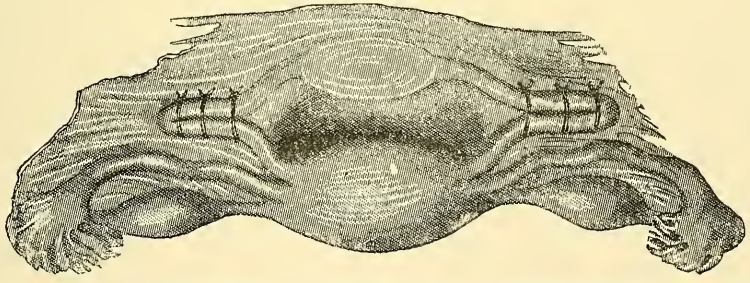

Fig. 257.—Hysteropexy; Wylie's Method. Shortening the round ligaments by intraperitoneal fold.

one's disposal, it may be sutured into the wound. I think, however, that it is not well to stop here, but to render the proper position of the organ certain by passing a few sutures through the superficial layers of the fundus or its anterior face, in the median line.

Another indication for hysteropexy, secondarily performed, is found in those cases where there are severe pains or painful reflexes dependent upon the state of the adnexa, which may be simply pro-

lapsed (movable retroflexion), or adherent (resistant or irreducible retroflexion), or involved in inflammation. Sänger and Leopold have combined castration with hysteropexy in the latter case. Hysteropexy alone suffices in simple prolapse of the ovary, thus becoming a conservative operation, for as the pains disappear after the uterus is fixed, Battey's operation is unnecessary.

The following modifications of abdominal hysteropexy are of considerable interest, although they seem to me inferior to those already mentioned.

Shortening the Utero-sacral Ligaments by the Abdominal Method.—This procedure, proposed by Kelly,[99] consists in passing a suture on each side of the rectum at the bottom of Douglas' pouch from within out, and then deeply into the cervix at the insertion of the utero-sacral ligaments. Frommel has performed it once.[100]

Shortening the Round Ligament by Intra-peritoneal Fold.—First Gill Wylie,[101] and then Emil Bode,[102] of Dresden, have proposed this operation. The procedure has been employed by Wylie[103] in a great number of cases. He folds and sutures the round ligament at its middle part and at a certain distance from the uterus, after removing the peritoneal surface of the ligament by scraping, so as to freshen it and permit its adhesion to the portion folded (Fig. 256 and 257). Polk[104] unites these ligaments in a letter X or cross from above the bladder, and provokes the formation of a fold which is internal, and not external, as in Wylie's method. G. Ruggi,[105] of Bologna, has also performed a complicated operation for the same purpose and obtained good results.

Immediate Abdominal Hysteropexy, without Laparatomy.—The old fear of the peritoneum, which still persists to a certain degree, has caused many surgeons to avoid opening it; and, on the other hand, the possibility of replacing a retroflexed uterus in such a way that its fundus came in contact with the anterior abdominal wall a long time ago gave rise to the idea of direct anterior fixation without laparatomy. According to Emmet,[106] Marion Sims first conceived this idea, in 1859, and constructed a special hollow needle to pass a silver suture, with this object; but having one day begun the operation, he had not the audacity to finish it. Caneva,[107] more than twenty years afterward, proposed abdominal hysteropexy for prolapse by piercing the serous membrane through a small exposed surface, but he does not seem to have performed it. Kaltenbach,[108] however, has employed it five times, using silver sutures. Kelly,[109] still more boldly but without

permanent success, has three times sutured the uterus to the abdomen by passing two or three horsehair sutures deeply through the fundus of the organ without preliminary incision; the sutures are fastened by a shot, and removed on the fifteenth day. Assaky [110] proposed this operation and furnished Roux, of Lausanne, the opportunity of showing its dangers by a personal case. Having begun to perform the operation, before suturing the peritoneum, which nothing seemed to separate from the uterus, he suddenly decided to make an incision, and found under the serous membrane a loop of very thin intestine which he must have punctured. This demonstrated the dangers of this brilliant but blind procedure.

Vaginal Hysterectomy.—This operation has been performed by certain surgeons for painful and rebellious retroversions,[111] but it cannot be considered justifiable except where other radical means have been exhausted, including abdominal hysteropexy.

Choice of Operation for Retroflexion.—The first indication in every case of painful retroflexion is to find the exact seat of the inflammation and the mobility of the uterus.

If the uterus is easily replaceable, it is probable that there is only a mild degree of metritis. If bimanual examination confirms this diagnosis, the inflammation must be cured before everything else; and therefore the treatment of catarrhal or chronic painful metritis should be at once begun. The curette should be employed, and if there is hyperplasia the cervix resected. I have many times observed that intravaginal amputation (Simon, Schröder) has been followed by spontaneous reposition of the uterus, owing, without doubt, to the involution which succeeds and imparts new tone to the organ. The same fact has been noted by others, and it explains the cases falsely attributed to complicated procedures of excision and suture which act, not upon the deviation, but the metritis.

When the uterus has been replaced, any tenderness about the adnexa should be treated. Then a pessary may be fitted, or preferably, a permanent reposition secured by Alexander's operation. If these measures fail, and if at the end of several months the deviation has been reproduced and the pains have returned, we are then authorized to perform laparatomy. Keith [113] followed the above plan in one of the first hysteropexies deliberately proposed and performed.

There is a class of movable retro-deviations to which Alexander's operation is especially adapted. In the higher ranks of society, we often observe women with a delicate nervous organization, who have

an easily reducible displacement with no inflammation but where too great mobility of the uterus seems to be the cause of all the symptoms. The uterus takes a new abnormal position after it has been replaced and is found in latero-version or flexion or even in anteversion. There is a condition of abnormal mobility of the organ, similar to that of certain joints with great laxity of the ligaments, as described by Gerdy. The pathological state which results is characterized by nervous reflexes and neurasthenia, and approaches without being easily confounded with that synthetized by Glenard[114] under the name of entero-ptosis. In such patients the application of a pessary gives immense benefit.[115] Yet Alexander's operation is better. These patients should also wear an abdominal supporter.

There remain now only the adherent retroflexions. Here the diagnosis appears to me to be of the greatest importance. I can almost agree with Wylie[116] that in nine cases out of ten, the adhesions have resulted from a coexistent salpingitis. It is dangerous, therefore, to make repeated attempts at reduction, either with the finger introduced into the dilated organ or with sound and repositor.[117] If, after a moderately thorough trial under chloroform, reduction cannot be accomplished, I abandon it. If there is metritis, I limit myself to the surgical treatment of this (curette and amputation of the cervix), with the hope that the pains will disappear with the cure of the inflammation. If there is serious disease of the tubes, old and persistent, I perform laparatomy.

If there is severe and persistent pain with no appreciable tubal disease, laparatomy, which is always exploratory to a certain degree in such cases, may be performed, when, if any developing lesion of the adnexa (pyo-salpinx, parenchymatous salpingitis, oöphoritis, sclerocystic degeneration of the ovary, etc.), is found, the diseased organ should be removed.

After castration on both sides and destruction of the adhesions, the uterus will frequently return to a normal position.[118] Strictly speaking, the operation of hysteropexy could then be dispensed with, but for fear that it may again be displaced posteriorly, it is well to suture it to the abdominal wall.

In cases where the retroversion coincides with a certain degree of general enfeeblement of the pelvic floor and of the supports of the uterus, marked by relaxation of the vagina and the gaping vulva, the patient is usually a multipara in whom the retroposition constitutes the first stage of prolapse. In these complex cases the various

contributing factors must be eliminated by a combination of operative measures; the metritis, by curetting and amputation of the cervix; the uterine deviation, by shortening the round ligaments if the uterus is movable, and by abdominal hysteropexy if it is adherent; the perineal weakness, by colpo-perineorrhaphy. Plastic operations on the perineum and vagina should be deferred until the uterus has been fixed, that we may better appreciate the amount of surface which needs to be denuded.[119]

As it seems to me unadvisable to devote a whole chapter to the consideration of the less important displacements of the uterus, I will simply enumerate them.

The uterus, from the pressure of a tumor posterior to it, may be pushed directly forward—anteposition; retro-uterine hæmatocele offers a striking example of this displacement, which is invariably an epiphenomenon.

Retroposition is a posterior displacement of the entire organ without any change in the long axis. This follows posterior para- or perimetritis, and may occasionally be observed in its typical and uncomplicated form; though as a general thing it is usually complicated by an anteflexion (Fig. 219). The symptoms observable are due to the inflammatory adhesions, and treatment should be directed to these alone.

Upward Displacement of the Uterus is also merely a symptom. Tumors in the pouch of Douglas, in the ligaments, or those imprisoned in the pelvis may lift the organ out of place; in some cases it seems to be upheld and prevented from returning to its normal position by adhesions formed during pregnancy. In all cases the cervix is elongated.

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50. Doléris: Traité des Flex. Uter. Gaz. des Hôp., 1888, No. 3.

51. Skutsch: Discussion at Halle Cong. Cent. f. Gyn., 1888, p. 392.

52. Schücking: Eine neue Meth. der Radicalheil. der Retroflex. Uteri. Centr. f. Gyn., 1888, Nos. 12 and 42. And also, Bemerk. über die Meth. der Vag. Fix., etc. Cent. f. Gyn., 1890, No. 8. He declares that he has employed his procedure in 62 cases; for the first twenty, thread was used, twelve cases alone cured of their displacement; but in the 42 cases where he employed a better technique there was no failure. Tampke: Zwei Fälle v. Retrofl., etc., ibid. Thiem: Meet. of Germ. Natur. at Heidelberg, Sept., 1889. Centr. f. Gyn., 1889, p. 735. This author has modified Schücking's operation a little, with success in 36 cases, which are too recent to prove anything. Löhlein, ibid., in the discussion said that he had observed a patient operated on by Schücking in whom the retroflexion had been reproduced.

53. Rabenau: Ueber neue operat. Behandl. der Retroflex. Berlin. klin. Woch., May 3d, 1886, No. 18, p. 284.

54. Schmidt: Cent. f. Gyn., 1888, p. 685.

55. E. Fraenkel: Deut. Med. Woch., 1888, Nos. 45 and 46.

56. Sänger: Cent. f. Gyn., 1888, No. 2.

57. Richelot: De l'Hysteropexy Vag. Comptes Rend. du 4ème Cong. de Chir., 1889. Bull. de la Soc. de Chir., Dec. 11th, 1889. Union Méd., December 11th, 1889.

L. H. Debayle: De l'Hysteropexy Vag., Paris Thesis, 1890. Nicoletis had not published anything before these papers; his first operation was done on the cadaver in 1887 and the first by Richelot on the living patient, June, 1889.

58. U. Trélat and S. Pozzi: Bull. de la Soc. de Chir., 1889, pp. 771 and 772.

59. Péan: Bull. Méd., Feb. 27th, 1889.

60. Candela and Dumoret: Laparo-Hysteropexy, etc. Paris Thesis, 1889, p. 23. See also Nouv. Arch. d'Obst., June 23d, 1889, p. 211.

61. Freund: Third Congr. Germ. Gyn. Soc., Freiburg, July, 1889. Cent. f. Gyn., No. 30.

62. Schultze: Zeit. f. Geb. und Gyn., Bd. xiv., Heft 1.

63. Sänger: Cent. f. Gyn., 1888, No. 2.

64. Kœberlé: Rétroversion de la Matrice Irreduc., Constip. Opiniâtre, etc. Bull. de la Soc. de Chir., 1877, p. 64. Schröder: Mal. des Org. Gén. de la Femme, French ed., p. 181, who cites this operation of Kœberlé's, in referring to Schetelig's article, Centr. f. Wissen., June, 1869, p. 417, remarks, "Qu'il ramena l'utérus en evant et le réunit ainsi qu'un pédicle de kyste ovarique au bord inférieur de la plaie;" this is an error, for there was no ovarian cyst; the confusion arises from the word "ovariotomy" which Kœberlé uses.

65. Sims: British Med. Journal, December 10th, 1887, p. 840. Courty: Traité Prat., etc., 3d ed., 1881, p. 707; in describing the two preceding cases he remarks, "I do not cite these operations as examples to imitate."

66. Schröder: Berl. klin. Woch., 1879, No. 1.

67. L. Tait: The Pathol. and Treat. of Dis. of the Ovar., 3d ed., pp. 94 and 96.

68. Hennig (Leipsic), cited by Sänger: Centr. f. Gyn., 1888, No. 2.

69. Olshausen: Ueber Ventraloper. bei Lageanomalien. 59th Naturforsch. Versamml. zu Berlin, Sept. 20th, 1886, analysis in Centr. f. Gyn., 1886, p. 667. This has been published complete under the title: Ventraloperation bei Prolap. und Retrovers. Uteri. Centr. f. Gyn., October 23d, 1886, No. 43, p. 698.

70. Session of September 20th, 1886. Centr. f. Gyn., 1886, p. 685.

71. H. A. Kelly: Hysterorrhaphy. Amer. Jour. Obst., January, 1887, vol. xx., p. 33. His paper was read before the Obst. Soc. of Phila. on November 4th, 1886 (Am. Jour. Obst., vol. xx., p. 67); but it was not published till January, 1887, after numerous additions from Olshausen's memoir, which he had read on September 20th, 1886, and published in Centr. f. Gyn. for October, 1886.

72. Sänger: Ueber operat. Behand. der Retrovers. Uter. Centr. f. Gyn., 1888, Nos. 2 and 3.

73. Klotz: Gyn. Soc. of Dresden, October 6th, 1887. Centr. für Gyn., 1888, No. 1, p. 11, and entire in Berlin. klin. Woch., 1888, No. 4. For the discussion between Klotz and Sänger see Centr. f. Gyn., 1888, Nos. 5 to 7.

74. Leopold: Ueber die Annähung der retroflekt. Gebärmut., etc. Centr. f. Gyn., 1888, No. 11. Communicated to Gyn. Soc. of Dresden, November 3d, 1887.

75. Kelly: Hysterorrhaphy. Amer. Jour. Med. Sci., 1888, p. 468.

76. These cases are actually hysteropexies and could be included in the same category with those which are complementary, done in the course of another operation.

77. Phillips: On Ventr. Fixat. of the Uter., etc. Lancet, October 20th, 1888.

78. Schauta: Prag. med. Woch., 1888, No. 29; analysis in Centr. f. Gyn., 1888, No. 45.

79. Czerny: Ueber die Vernähung der rückwärts gelag. Gebärmut. Beiträge zur klin. Chir., Bd. iv., p. 164.

80. S. Pozzi: Rapport sur une Observ. de Picqué. Bull. Soc. Chir., Dec. 5th, 1888, p. 936. Terrier: Ibid., Nov. 28th, 1888, p. 901.

81. For the operations performed in France, see Bull. Soc. Chir., 1889, p. 46 et

seq. Terrier, 3 cases for retroversion; Routier, 1 case; Championnière, 2 cases; Polaillon, ibid., p. 66, a fatal case for prolapse. I have performed hysteropexy for retroversion twice, one case remaining cured after more than a year. In one of my cases the round ligaments had been shortened a few months before by a skilled operator without result (S. Pozzi, Annal. de Gyn., May, 1890). Beside the works already cited, see: Fritz Reih: Inaug. Dissert., Jena, 1888 (case of Schultze). Fraipon: Annal. Soc. Médico-Chir. of Liége, No. 3, Mar., 1889, p. 114 (case of Winiwarter's). Terrier: Hysteropexie dans le Prolaps. Uter. Rev. de Chir., March 10th, 1889. Dumoret: Laparo-Hysteropex., Paris Thesis, 1889. Doléris: Soc. Obst. et Gyn. de Paris, April 11th, 1889, in Repert. Univers. d'Obst. et de Gyn., 1889. Lee: The Value of Hysterorrhaphy, etc.; Am. Jour. Obst., Dec., 1889, p. 1,249; report of 6 operations, 4 complete success, 1 failure, 1 too recent. Küstner (Dorpat): 3d Cong. German Gynäk., June, 1889 (Cent. f. Gyn., 1889, No. 32); employs hysteropexy for adherent retroflexions, and advises the use of the thermo-cautery to divide adhesions. Sänger, ibid., has performed ventro-fixation 12 times, 7 after castration, 5 without removal of adnexa; no retroversion in any case. Hegar, ibid., has done the operation once; used silk, but the uterus was not maintained; not a partisan of the operation. Leopold: Samml. klin. Vorträge, No. 333, 1889; 9 operations and some of his patients cured after two years. In a more recent communication (Gyn. Soc. of Dresden, July 4th, 1889, and Cent. f. Gyn., 1890, p. 185) declares that patients are still well after three years, without return. Marschner: Cent. f. Gyn., 1889, No. 10, p. 159, had one failure by Leopold's method. Schramm: Cent. f. Gyn., 1890, p. 185, 9 successful cases. Czerny: Beiträg. zur klin. Chir., Bd. iv., Heft 1, 4 hysteropexies after ablation of the adnexa and destruction of the adhesions. Zinsmeister: Obst. and Gyn. Soc. of Vienna, May 14th, 1889, Cent. f. Gyn., 1889, p. 831, operated 3 times after no success with massage. Lehotzky: ibid., reports 7 cases. Slaviansky: Obst. and Gyn. Soc. of St. Petersburg, Feb. 23d, 1889; Cent. f. Gyn., 1889, p. 834, 2 cases, of which 1 after castration; Leopold's method. Veit: Obst. and Gyn. Soc. of Berlin, Nov. 8th, 1889, Ueber die Indications-Stellung der Retroflexionstherap.; Cent. f. Gyn., 1889, No. 49, p. 850. Cohn, ibid., reports 4 cases with success; one of but 6 months; employed silk and attributed early disunion to catgut. Odebrecht, ibid., 4 cases; Leopold's method; very recent. Marcel Baudouin collected in an important paper on the subject more than 200 cases of laparo-hysteropexy up to 1890.

82. S. Pozzi: Bull. de la Soc. de Chir., Nov. 11th, 1888. Dumoret: Paris Thesis, 1889, p. 119.

83. Czerny: Beitr. Chir., 1888, Bd. iv., p. 184.

84. Müller: Corresp. Blatt Schweiz. Aerzte, 1878, Bd. ii., p. 188.

85. Kaltenbach: Zeit. f. Geb. und Gyn., 1878, Bd. ii., p. 188.

86. The author in a recent article on hysteropexy has wrongly considered Polk's briefly described procedure as analogous to that of Klotz (Trans. Am. Gyn. Soc., Sept., 1887; Am. Jour. Obst., vol. xx., p. 1,045). In his paper, "Should the Ovaries and Tubes be sacrificed in every Case of Salpingitis?" Polk remarks that when the deviation (backward) was due to the action of the adnexa, "he had twice attempted, after detaching adhesions, to work a cure by the simple action of a drainage tube; but that his results were inferior to those obtained by Alexander's operation in the same cases." Here was then no fixation of the uterus but only a reposition, while Klotz carefully sews the ovarian or tubal pedicle to the abdominal wall.

87. Kelly: Am. Jour. Med. Sci., May, 1888, p. 468. New York Med. Jour., Oct. 5th, 1889, p. 583.

88. Leopold: Cent. f. Gyn., 1888, No. 11, et ibid., 1890, p. 185.

89. Czerny: Beiträge zur kl. Chir., Bd. iv., Heft 1, p. 179.

90. Dumoret: Loc. cit. (60).

91. The author, who analyzes Lee's paper (Am. Jour. Med. Sci., 1889, p. 216), cites two deaths, one immediate, one late, after gastro-hysteropexy; they do not seem to have been published. Polaillon (Bull. Soc. Chir., 1889, p. 66) reports one death after operation for prolapse.

92. Leopold: Cent. f. Gyn., 1890, p. 185.

93. Korn: Cent. f. Gyn., 1888, p. 11.

94. Sänger: Verhandl. der Deutsch. Gesell. f. Gyn., 2d Congress, 1888, p. 110.

95. Sänger: Semaine Méd., June 19th, 1889, p. 204.

96. Dumoret: Du Prolapse Utérin, etc. Gaz. des Hôpit., Nov. 30th, 1889.

97. Küstner: Third Cong. Germ. Gyn. Soc., Freiburg, June, 1889. Ann. de Gyn., Oct., 1889, p. 295.

98. Trélat: Des Retrovers. et des Retrofl. adhérents. Sem. Méd., July 4th, 1889.

99. Kelly: Am. Jour. Med. Sci., 1888, vol. xcv., No. 5, p. 468. Noble: A System. Stretch. for Short. Broad and Utero-sac. Lig. Atlanta Med. and Surg. Jour., 1888–89, vol. v., pp. 75–82.

100. Frommel: Cong. Germ. Gyn., Freib., 1889. Cent. f. Gyn., 1889, No. 32. Ueber oper. Behandl. des retr. Uter., Cent. f. Gyn., 1890, No. 6. Reports a case of more than one year's standing.

101. G. Wylie: Surg. Treat. of Retrovers., etc. Am. Jour. Obst., May, 1889, vol. xxii., p. 478.

102. E. Bode: Gyn. Soc. of Dresden, June 6th, 1888. Cent. f. Gyn., 1888, No. 48. His first operation on May 10th, 1888; Cent. f. Gyn., 1889, No. 3. Wylie operated first in 1886; described it in June or July, 1888, in the Pittsburg Review.

103. Wylie: Am. Jour. Obst., May, 1888, p. 478. Am. Jour. Med. Sci., 1889, p. 325. Medic. Record, Nov. 30th, 1889.

104. W. Polk: Observat. on Surg. Treat. Retrovers., etc. Trans. Am. Gyn. Soc., vol. xiv., 1888, Philadelphia. A very short analysis of this paper in Am. Jour. Obst., Oct., 1889, p. 1,066.

105. G. Ruggi: Sulla Cura Endo-Abdom. de Alcani Spostam. Uter. Bollet. d. Scienze Med. d. Soc. Medico-Chir. d. Bologna, serie vi., vol. xxii., Fasc. 1 and 2, 1888. Micheli: Riforma Med. Rome, Jan. 8th and 9th, 1889. This article relating to Ruggi's procedure analyzed in Rev. Sci. Méd., Hayem, July, 1889.

106. Emmet: Trans. Amer. Gyn. Soc., Boston, September, 1889. Amer. Jour. Obst., October, 1889, p. 1,068.

107. Caneva: Gazetta degli Ospit., December 20th, 1882, No. 102, p. 810.

108. Kaltenbach: Meet. of Germ. Natur., Heidelberg, September 3d, 1889. Centr. f. Gyn., 1889, p. 731.

109. Kelly: Amer. Jour. Obst., October, 1887, p. 1,068.

110. Assaky: Bull. Soc. Chir., Nov. 20th, 1889; he has since then operated without accident. La Clinica, Bucharest, No. 1, 1890.

111. Roux: Bull. Soc. Chir., Dec. 4th, 1889. Richelot: Union Méd., 1886, p. 101. Bouilly: Bull. Soc. Chir., Oct. 24th, 1888.

112. Triare: Retr. de l'Uter.; Guérison par l'Excis., etc. Gaz. des Hôpit., May 26th, 1889. Quénu: Bull. Soc. Chir., 1889, p. 771.

113. Keith: Ed. Med. Jour., July, 1886.

114. F. Glenard: Neurasthén. et Entéroptose. Sem. Méd., May 19th, 1886, p. 211.

115. Terrier: Bull. Soc. Chir., April 3d, 1889, p. 277, "I cannot advise pessaries, for which I have an instinctive horror." Bouilly: ibid, p. 293, justly opposed this radical opinion, which I also combated (ibid., p. 295).

116. Wylie: Loc. cit. (101), p. 482.

117. Delbet: Bull. Soc. Anat., 1888, p. 980. Picqué: Bull. Soc. Chir., 1889, p. 937.

118. Routier: Bull. Soc. Chir., Jan. 16th, 1889.

119. The necessity of combined operations in this class of case has been very clearly formulated by Doléris, Gaz. Méd., Paris, April, 1886; Nouv. Arch. d'Obst., 1886, p. 350; Mém. de la Soc. de Méd., Paris, in Union Méd., June 11th, 1887; Mem. to Americ. Gyn. Soc., 1887, p. 488. These last two are reproduced in Nouv. Arch. d'Obst. et de Gyn., Jan. and Feb., 1890. Mundé: The Value of Alexander's Operation; Am. Jour. Obst., Nov., 1888, vol. xxi., pp. 1,132 and 1,136. This author has for a long time practised combined operations and remarks that to do plastic operations on the perineum before fixing the uterus is to "put the cart before the horse."

CHAPTER XIX.

PROLAPSE OF THE GENITAL ORGANS.

Following Trélat's[1] example, I include under one head prolapse of the uterus, that of the anterior vaginal wall pulling upon the bladder (cystocele) and of the posterior wall dragging forward the rectum (rectocele). These several displacements have been artificially classified as separate, but in reality should be described together, since the cases when they occur independently of each other are quite exceptional. The etiology and the treatment of these lesions also serve to give them absolute clinical identity. Moreover, hypertrophy and elongation of the cervix should be included in the anatomy and symptomatology of these displacements.

Etiology.—Hart[2] very wisely compares these displacements to hernia. But there is this difference between them: in an ordinary hernia, the parts pushed outward by intra-abdominal pressure are freely movable (intestines, omentum), while in a uterine prolapse we have to do with organs fixed or limited in situation by their firm attachments, and which consequently when displaced are likewise distorted. This is the chief reason for the hypertrophic elongation of the cervix. As in herniæ, however, we recognize displacements due to violence and those due to weakness. The first follow a violent effort of some kind, which is either sufficient in itself to cause the injury, or which is injurious because of predisposing conditions. A fall upon the back, an epileptic seizure, a violent attack of coughing have all been the direct cause even in virgins of what some authorities term acute prolapsus.[3] In the majority of cases, however, the uterine supports have been enfeebled by one or more labors, and some violent strain is merely the determining factor of the prolapse. Pregnancy[4] is often a predisposing cause of this displacement, a fact which can be readily understood when we consider the changes which have taken place in the parts surrounding the gravid uterus. All the ligaments are elongated and at the same time softened; intra-abdominal pressure is increased, and bears with more than the usual force upon the weak points of the pelvic floor, where the vagina forms a line of

cleavage which seems always ready to give way under increased strain.

Whatever may have been said to the contrary,[5] rupture of the perineum is a predisposing cause of prolapsus uteri. It permits of a gaping condition of the vulva which admits air into the vagina, separating its walls, and diminishing the support offered by the perineal floor. It has been asserted[6] [and truly] that the transversus perinæi and the levator ani may have sustained a subcutaneous laceration, or may have been paralyzed during labor, without giving any external evidence of the injury. The relaxed condition of the peritoneum, which has been stretched by the gravid uterus, also tends to favor the prolapsus induced by parturition.

Shall we go further and admit the existence of an hereditary congenital predisposition[7] to prolapse, or consider the predisposition to be simply an individual peculiarity due to the weakness of the supporting genital apparatus?[8] The latter view certainly seems reasonable, and would account for the fact that the same cause is productive of varying results in different individuals. It is the same in the case of hernia.

Pathological Anatomy.

In this connection it is absolutely essential to observe a certain classification of the disorders under consideration.

1. Prolapse of the Vagina alone (*Cystocele and Rectocele*).—In the great majority of cases, prolapse of the vagina precedes that of the uterus, the uterine displacement following in the course of time as a result of the downward dragging. The condition may exist for a while alone. The anterior vaginal wall is the more easily displaced. In women who have borne many children it is not unusual to observe a small cystocele when the bladder is full. This is, however, in no sense a pathological phenomenon, the anterior vaginal wall simply exceeds the posterior in length, and, providing that the perineum possess a sufficient degree of tonicity to support it, the results are of little consequence. If, however, the perineum be deficient in tone, a form of vesical hernia follows, as the posterior wall of the bladder is intimately associated with the vagina and cannot be separated from it. This vesical protrusion is sometimes more apparent than real, the protuberance (compare Figs. 258 and 260) being mainly the subinvoluted and thickened vaginal wall. The posterior vaginal wall soon

follows the anterior, and the dilated rectal pouch becomes insinuated between its folds; though as the intestinal and vaginal walls are only loosely connected, rectocele occurs less frequently than cystocele.

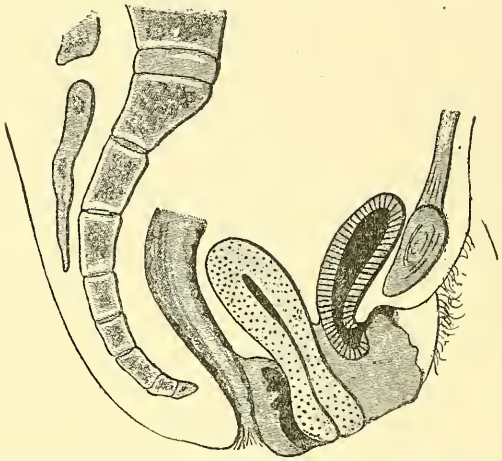
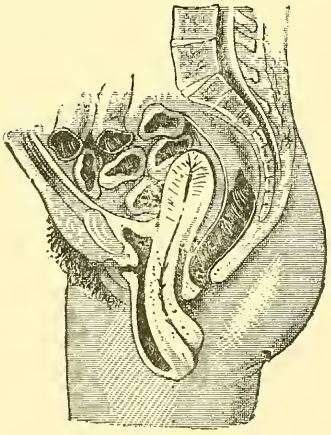


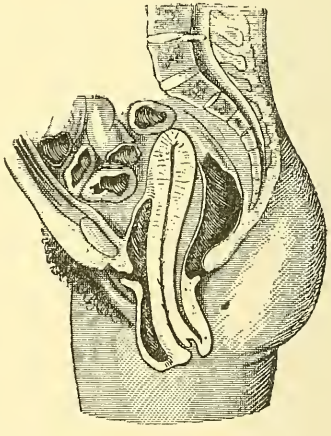
FIG. 258.—PROLAPSE OF GENITAL ORGANS. Procidentia of thickened anterior vaginal wall; slight cystocele; persistence of posterior cul-de-sac; hypertrophy of middle portion of cervix.

When both are present, a finger introduced through the anus can be hooked into the posterior part of what appears at the vulva as a va-



A

FIG. 259.—PROLAPSE OF GENITAL ORGANS. Procidentia of anterior vaginal wall with cystocele, and hypertrophic elongation of the middle portion of the cervix (Schröder). The posterior cul-de-sac is intact.



B

FIG. 260.—PROLAPSE OF GENITAL ORGANS. Complete procidentia of vagina, with cystocele; no rectocele; hypertrophic elongation of the supravaginal portion of the cervix; the posterior cul-de-sac is inverted.

ginal protrusion, while a curved catheter can easily be inserted into the cavity of the cystocele. We have then a double-lobed protrusion into

the vagina (the lobes being usually of unequal development), which enlarges and becomes tense upon straining, and the surfaces of which still retain the folds and the color of the vagina. Under the influence of the air and friction it thickens, hardens, and sometimes ulcerates. If there be no prolapse of the bladder (which is rare) or of the rectum (less rare), the peritoneum may insinuate itself into, and greatly deepen, the anterior and posterior culs-de-sac. This condition presupposes immobility of the uterus and flaccidity of the serous membrane, or else (according to Freund) lack of development, for, in the fœtus, the folds of peritoneum are relatively much lower down. A portion of the small intestines may now fall to the front or back, pushing down the vaginal wall, and forming what have been called herniæ or vaginal

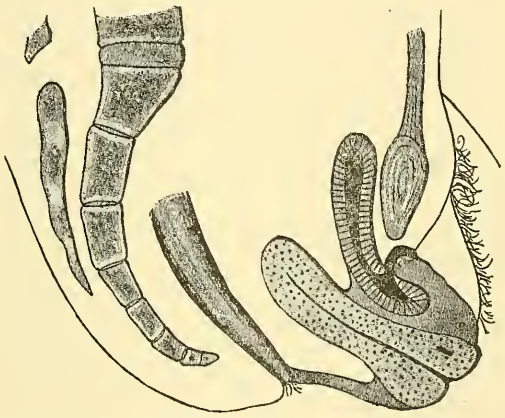


FIG. 261.—PROLAPSE OF GENITAL ORGANS. Complete procidentia of thickened vagina; slight cystocele; posterior cul-de-sac obliterated; hypertrophy of supra-vaginal portion of cervix.

enteroceles. These lesions are exceedingly rare in their occurrence, there being on record but few cases of vaginal prolapse with anterior enterocele,[9] and still fewer of vaginal prolapse with posterior enterocele.[10]

2. Vaginal and Uterine Prolapse with Secondary Hypertrophic Elongation of the Cervix.—The constant dragging of a prolapsed vagina upon its attachments to the cervix soon affect the uterus itself. These attachments are loosened by degrees, and finally slip down in such a way that the projection of the cervix completely disappears, being covered by the portion of vaginal wall which formerly constituted the culs-de-sac. The uterus being still immovable, and the vagina continuing to drag downward, the cervix, which is now entirely supra-vaginal, gradually elongates. Occasionally it is lengthened without

any hypertrophy, but more often the passive congestion and the inflammation in the prolapsed organs bring about a hypertrophic condition—this hypertrophy being entirely a secondary process. The preliminary disappearance of the cervical projection is what marks the beginning of this process, the cervix then being perceptible to palpation as a cylindrical column in the centre of the inverted vagina.

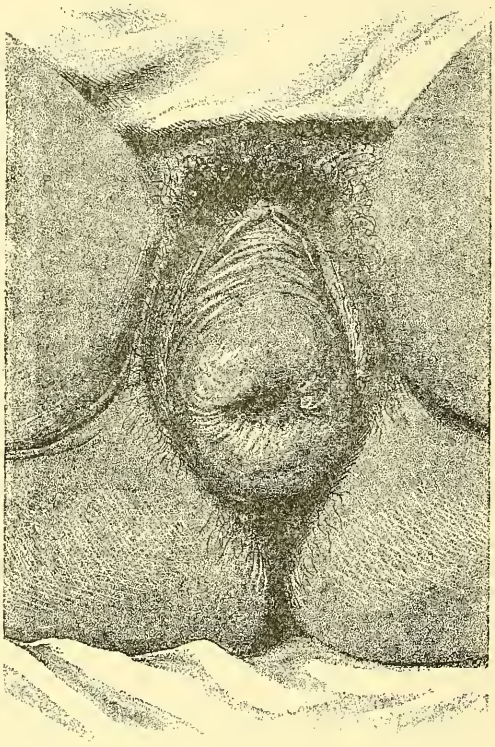


Fig. 262.—Prolapse of the Uterus, with considerable hypertrophic elongation of the cervix; cystocele.

If, as not infrequently occurs, the posterior vaginal wall gives way later and less completely than the anterior, the vaginal procidentia will be in front only, and the posterior cavity of the vagina will still remain; a finger introduced into the posterior cul-de-sac (Figs. 258 and 259) will be able to appreciate the fact that the posterior portion of the cervix is hypertrophied.

This somewhat singular condition of things is quite accounted for by the preceding considerations, although Schröder gives a more elaborate explanation. He thinks it due to the fact that the hypertrophy

begins in the middle portion of the cervix, intra-vaginal posteriorly, supra-vaginal anteriorly (Fig. 264, *b*, *b*).

3. Prolapse of Vagina and Uterus Resulting from a Primary Hypertrophic Elongation of the Supra-Vaginal Portion of the Cervix. —This condition was for a long time unrecognized, and is still disputed by some authorities (Virchow); it nevertheless exists, although it is of less frequent occurrence than Huguier supposed. In some virgins with firm vagina and perineum and no prolapse of the uterus,

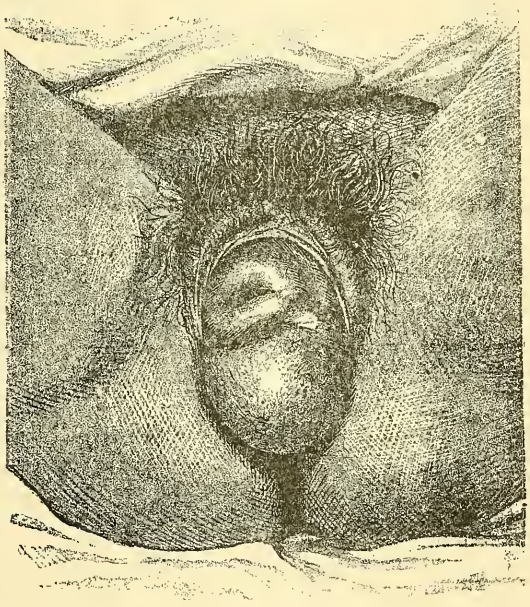


FIG. 263.—PROLAPSE OF THE UTERUS. Hypertrophic elongation of the cervix ; rectocele.

an inversion of the upper part of the vagina may be observed, coexistent with a supra-vaginal hypertrophy of the cervix.[11] I operated upon such a case when with my lamented preceptor Gallard. We are forced to admit that the initial elongation of the cervix drags upon the vaginal attachments, yet, although the starting-point of the process is always the cervical hypertrophy, later the rôles may be reversed, and the vaginal procidentia become of chief importance, in its turn causing elongation of the cervix. The position of the intra-vaginal cervix will aid in determining whether this condition of things exists; it is so often lengthened by hypertrophy that if we find it in normal position we may be quite sure that the vaginal attachments are not dragging upon it. This influence exerted upon prolapse of the genitalia by

hypertrophy and elongation of the cervix above the vaginal attachment had been observed and remarked upon by several authorities, but was given no special prominence until Huguier published his celebrated treatise[12] upon the subject. With sovereign ability he demonstrated, by the aid of clinical and anatomical material, the fact that in the great majority of cases downward displacement of the uterus has been wrongly interpreted; there has not been prolapsus or falling or precipitation of the uterus in its entirety out of the abdominal cavity through the vulvar opening, hernia-fashion, but rather a lengthening of the supra-vaginal portion of the cervix which, undergoing hypertrophy and being unable to extend into the abdomen, pushes downward into the vaginal aperture, dragging after it the

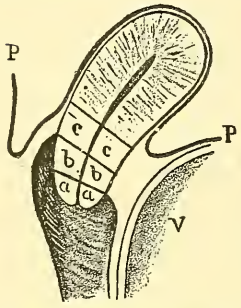


FIG. 264.—SUBDIVISIONS OF THE CERVIX (SCHRŒDER). *P*, peritoneum; *V*, bladder; *a*, intra-vaginal portion; *b*, middle portion (intra-vaginal posteriorly, supra-vaginal anteriorly); *c*, supra-vaginal portion.

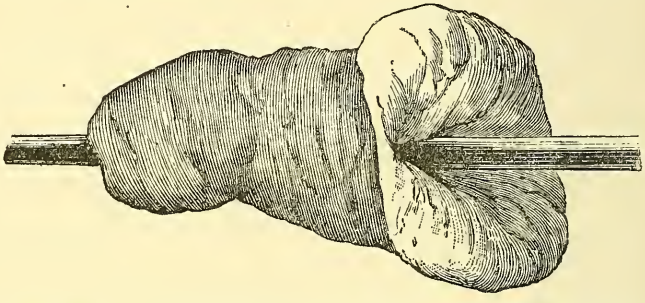


FIG. 265.—CONOIDAL AMPUTATION OF THE CERVIX (Huguier's method). Portion of cervix thus obtained (transfixed by a sound). Natural size.

vagina and neighboring viscera, which are more or less closely adherent. This theory advanced by Huguier was revolutionary to the ideas previously entertained, which held that the prolapse of the uterus was the last step in its downward displacement, this being divided into three degrees: 1st. Simple downward displacement. 2d. Descent, the cervix appearing between the labia. 3d. Prolapse or precipitation, where the fundus has followed the cervix and is entirely outside of the vulva.[13] According to Huguier, this order of progression without a preceding cervical hypertrophy is very exceptional, the cervical changes constituting the initial lesion and causing the real displacement of the vagina and the apparent displacement of the uterus. It forms the point of chief importance in the condition and to it should the treatment be directed. Huguier performed conoidal amputation of the cervix; he first dissected it out from the vesical and rectal attachments, and then amputated as high as possible (Fig.

265). I have frequently performed this operation and found it valuable. But if done according to Huguier's method, without approximating and fastening the mucous membrane by sutures, it will lead to contractions, of small importance in women who have passed the menopause, but of great inconvenience to those still menstruating. A proper appreciation of the value of Huguier's theories upon this point will give it a high position, without, however, rushing to the extreme of Gallard [14] and others who undoubtedly overestimated it.

From an anatomico-pathological point of view, he established the

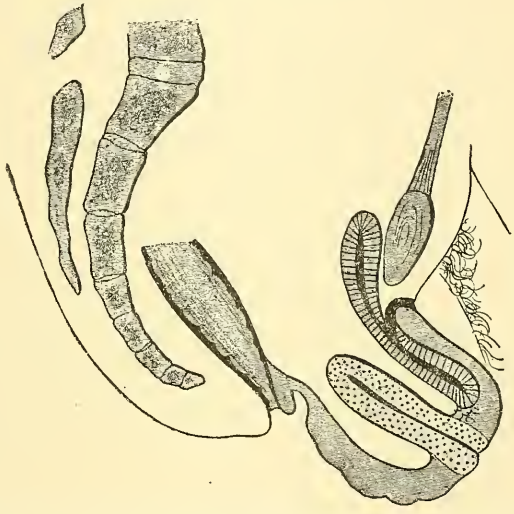


FIG. 266.—PROLAPSE OF THE UTERUS, following a retroversion ; no hypertrophy of the cervix.

fact of the frequent occurrence of a hypertrophic elongation of the supra-vaginal portion of the cervix, in prolapse of the genital organs.

It is true, that this hypertrophy is not invariably the primary manifestation that he supposed. It is in fact usually the secondary elongation due to the traction exercised by the prolapsed vagina; while the hypertrophy is the result of venous stasis favoring a parenchymatous cervical endometritis. Yet the fact remains, that it had been unrecognized, and to him belongs the credit of bringing it into notice, and of calling attention to and causing the adoption of amputation of the hypertrophied cervix as a method of treatment. That it is of less value than he at first supposed, scarcely detracts from the merits of his discovery, when we recall the almost constant failure of all plastic operations, before the introduction of antisepsis. Amputa-

tion of the cervix still holds its own in therapeutics as an important preliminary step in operation for prolapsus.

What is the nature of this hypertrophy of the cervix? When it follows the continuous traction of a prolapsed vagina, it is undoubtedly an inflammatory process. But when it constitutes the first step in the process, what is its origin? Is it the result of a congenital predisposition to malformations, manifested only when the organ is completely developed either at puberty or from the nutritive activity called into play by pregnancy? Is it the indication even, in the latter case, of a localized cervical endometritis, as Gallard supposes? Each of these factors may operate singly or together. The histological

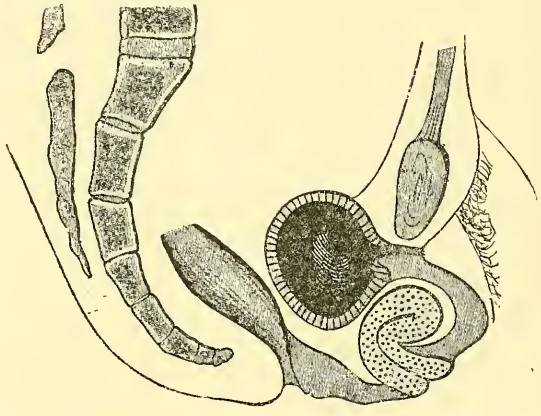


FIG. 267.—PROLAPSE OF THE UTERUS WITH ANTEFLEXION; it is no longer connected with bladder and rectum; these organs meet above the uterus.

examination does not give any very satisfactory result. Olivier[15] has given a *résumé* of such examinations upon cervices which I had removed, according to Huguier's process, when in Gallard's service. He found no hypertrophy, but he did find a localized arterio-sclerosis. The sections examined were similar in structure to those of a uterus with endometritis. Moreover, the distinction was not carefully observed between sections taken from a cervix where the hypertrophic elongation was a secondary process and those where it was primary. Inflammatory lesions may often be secondary, for every prolapsed uterus is almost certain to develop a catarrhal endometritis.

4. Prolapse of Uterus and Vagina without Hypertrophy of the Cervix.—A slight sinking of the uterus, rendering it more easily accessible to the examining finger, and deepening the vaginal culs-de-sac, is frequently observed. But complete prolapse is rare because of the re-

sistance to be overcome. (Bastien and Legendre[16] certainly exaggerated the amount of resistance encountered. According to their statements, it takes a force of from twenty to twenty-five kilograms [forty-four to fifty-five pounds] to pull the cervix to the vulva upon the cadaver, and of over fifty kilograms [one hundred pounds] to draw it below this opening. Daily clinical experience proves that upon the living subject this same thing can be done without any violent exertion, but owing to the elasticity of the tissues the organ returns to its normal position as soon as released. In a pathological condition this elasticity is lost, and the organ remains out of position.)

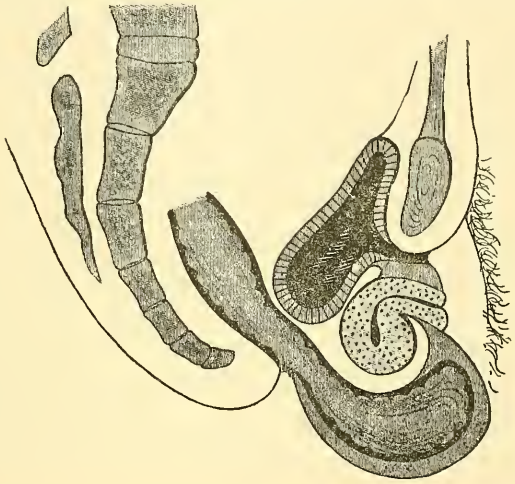


FIG. 268.—PROLAPSE OF THE UTERUS WITH RETROFLEXION; rectocele.

It may be termed a hernia from violence, since so great an effort is required to produce it. In this case the uterus usually drags the vagina after it; the organ itself is usually retroverted, this displacement rendering the occurrence of prolapse more probable under strain (Fig. 266). After the uterus has emerged beyond the vulvar opening, it may undergo deviations from its normal axis, and, suspended in its hernial sac, become ante- or retroflexed (Figs. 267, 268). Inversion combined with prolapsus has also been observed.

The relations of the neighboring organs vary according to the kind and degree of the displacement; as a general rule, the greater the cervical hypertrophy (and by cervix we here mean exclusively the supra-vaginal portion) the farther are the folds of peritoneum from the uterine orifice; on the other hand, in the variety shown in Fig. 266 they would be very near to it.

With a marked rectocele (Fig. 268) fecal matters tend to accumulate and harden in the pouch.

A cystocele usually results in the formation of a wallet-shaped bladder, whose lower pocket is situated below the internal urethral opening, this frequently giving rise to stagnation of the urine (Figs. 259 and 266). There is often dilatation of the bladder, and even of the ureters and the pelvis and calyces of the kidney, owing to the strain upon or compression of the lower end of the ureters.[17] Calculi are said to have been found in the cystocele, but there are fewer cases reported than the theories advanced would lead one to expect.[18]

The vaginal mucous membrane is thickened, often resembling skin or leather, and becomes blanched or violet-colored. The prolapsed portions are œdematous, and we frequently notice ulceration of the cervix, ectropion of the os, or excoriations and ulcerations due to friction of the surface of the tumor. Endometritis almost always occurs in a prolapsed uterus, and salpingitis is not infrequent.

Symptoms.—Acute prolapsus, as it has been termed, meaning that which immediately follows some violent strain, is rare, yet cases have been reported. Immediately after the accident, a tumor formed by the anterior wall of the vagina alone, or by the uterus as well, is seen hanging out of the vulva. Intense pain, sometimes syncope and peritonitis, accompany the lesion. Usually, however, the prolapse is gradual, and gives rise to no well-marked symptoms; a feeling of heaviness referred to the perineum, a dragging sensation in the loins and abdomen, fatigue upon walking, are the chief, accompanied by the ordinary symptoms of endometritis, besides troubles connected with micturition, dysuria, polyuria, incontinence, or retention, with or without cystitis. If there be a very large cystocele, the patient may be obliged to assist micturition by external pressure upon the protruding bladder. Menstruation is unaffected. Fecundation is rare, though possible, in complete prolapsus. Abortion may follow, but, again, the gravid uterus may develop normally in the abdomen, casing a temporary disappearance of the displacement.

In prolapsus, as in hernia, the severity of the rational symptoms does not always depend upon the gravity of the lesion. Often women apply for admission to the hospital, with a uterus suspended between the thighs, who have, in despite of this condition, continued to perform hard manual labor with apparent ease, until some accident obliges them to stop and undergo treatment. On the other hand, some patients whose uterus is only slightly fallen, and is not even near the

vulvar opening, complain of intense pain when walking, and are reduced to a state of invalidism. It would seem as if, in the former case, a new and definite static condition of the uterus had been developed, giving tolerance to a well-marked lesion, while in the latter case this species of compensation had not been acquired; the unstable condition of the uterus giving rise to numberless twinges of pain, and nervous reflex phenomena, which make a prolapsus uteri one of the manifestations of "entero-ptosis," that group of symptoms so ably classified by Glénard.[19]

The physical signs are very characteristic.[20] In the early stages of a prolapse, the vaginal mucous membrane, though very flaccid, does not appear beyond the vulvar opening unless the patient strains. By placing her in the dorsal position and bidding her bear down, one may see the anterior vaginal wall bulge outward by a sort of rotary motion, forming a soft, pinkish tumor, which returns in place with the cessation of the downward straining.

It is well to bear in mind that the anterior and posterior vaginal walls are normally in apposition, so that a section of the canal in a state of rest would be well represented by the letter H. The procidentia of the vagina could scarcely be cylindrical, as in the case of the rectum; the anterior or posterior walls simply slip down, either singly or together. This first degree of cystocele soon gives place to the permanent and more severe form, and later the os uteri appears just behind it, discharging the mucus produced by the cervical catarrh. If the posterior vaginal wall be involved, the os seems to be in the centre of a pyriform tumor which opens out the labia minora, and whose surface is dry, wrinkled, darkened by exposure to the air, and occasionally, in addition to ulcerations around the os, suffers a loss of substance from friction and lack of cleanliness. A furrow surrounds the tumor at the base, especially near the fourchette. The size of the tumor varies from that of an egg to that of two doubled fists (Figs. 262 and 263).

Palpation will give different results according to whether the uterus shares in the prolapse or not. Everything included in the vaginal procidentia is soft and flabby. Tension and elasticity of the cystocele increase when the bladder is full. The existence of an enterocele (which is of rare occurrence) is shown by gurgling. When the uterus is prolapsed without any cervical hypertrophy, the body even of the organ may be felt in the interior of the presenting tumor (Figs. 266, 267, 268). But in the typical cases described of prolapsus

either preceded or followed by hypertrophy of the cervix, only this portion of the uterus is to be found in the tumor (Figs. 258, 259, 260 261) of which it forms the axis. It is more or less thick and rigid according to circumstances, imparting to the hand the sensation of a cord, or of an elastic cylinder; by bimanual palpation it is found to be continuous with the body of the uterus, which is behind the pubic bone.

The insertion of the uterine sound will reveal pathognomonic signs in the case of cervical elongation; it passes for a length of from four to eight inches. [A curious fact often noted in these cases of cervical hypertrophy is the apparent "ductility" of the tissues, a uterus which when prolapsed is seven or eight inches in depth measuring only about four when fully replaced.] We must remember that in aged women there may be obliteration of the cervical canal. The tumor is perfectly reducible when the uterus has not participated in the prolapse; even if it has done so, it may be reduced, but is with great difficulty kept in position. A permanent cure is almost always impossible; the firm column in the midst of the tumor formed by the hypertrophied cervix could only be pushed into place by a degree of violence that might be the cause of injury.

The exact position of the bladder may be determined by the use of a male catheter, which is introduced with the tip turned downward. The bladder often reaches the immediate neighborhood of the uterine orifice (case of secondary elongation of the cervix from traction) (Fig. 260); in other cases the os uteri, which has remained normal, causes another and sometimes large bulging below the lower extremity of the bladder (primary hypertrophic elongation of the supra-vaginal portion of the cervix (Figs. 261 and 262).

Course and Prognosis.—The course of the disease is chronic in its nature, and, if untreated, results in a complete prolapsus. In some patients this descent of the genital organs is coexistent with other large herniæ, and forms a pelvic condition quite as incurable as the abdominal disembowelling. Cases have been referred to[21] where a spontaneous cure followed the temporary reduction of a prolapsus, when the uterus was bound down by adhesions formed by peritonitis. These cases seem to me to need confirmation.

Diagnosis.—By bimanual palpation, rectal touch, and the use of the uterine sound and the catheter, we may distinguish the tumor which emerges through the vulvar opening, from a polypus or an inverted uterus. The chief difficulty consists in determining precisely

what parts have shared in the prolapsus, and to what extent they have altered, whether in position, form, or size. A male catheter introduced into the bladder will determine the boundaries of the displacement; a finger hooked into the rectum will appreciate any folds of intestine anteriorly; while the hypertrophied condition of the cervix may be felt by means of palpation and the uterine sound. The condition of the peritoneal culs-de-sac it is impossible to tell, except when efforts at reduction result in a gurgling sound and give rise to the supposition that loops of intestine are to the front and behind the prolapsed uterus. As I have before observed, these enteroceles are of rare occurrence, and are never found where there is supra-vaginal hypertrophy of the cervix. In this case the peritoneum is farther away from the vagina than in the normal condition; in simple descent without cervical hypertrophy it is, on the contrary, nearer to the vagina (Fig. 266).

Urethrocele is an interesting variety of vaginal prolapse, which may almost be considered a special form of cystocele; Professor Duplay[22] has published an important treatise upon the subject. The tumor is formed by the dilatation of the urethra, or by a cavity opening into this canal, the bladder not being implicated. A tumor, rarely larger than a walnut, appears at the vulva, and is situated immediately beneath the urethra, apparently in the meatus; straining brings it more into view. It is only by a careful examination that we are able to distinguish it from cystocele; we then see that it extends only a little way upward and is not connected with the bladder, which has no tendency to prolapse. The catheter passes into the pouch of the urethrocele and then into the bladder; the inferior wall of the urethra, which is deflected, is much longer than the anterior wall, which has retained its normal position. The urethro-vaginal wall is sometimes greatly thickened and sometimes much thinned. It is doubtful whether a urethrocele, by continuing to dilate, can ever pass into the bladder and become a cystocele.

Treatment.—The prophylaxis of prolapse of the genital organs consists in the careful conduct of labor and subsequent rigid observance of hygienic laws. Belts and pessaries give little help; yet we must not neglect to support the abdomen by a well-constructed bandage which will keep the intestines from bearing down with their full weight upon the pelvic organs.

Pessaries are of use only when the perineum has preserved a degree of tonicity; their action is often aided by a perineal pad (Figs.

269 and 270). Breisky [23] claims good results from an egg-shaped pessary which is held sufficiently in place by the narrow vaginæ of aged women. Dumontpallier's ring pessary, Hodge's pessary, Schultze's sled-runner pessary, the "gimblette" pessary, Gariel's air pessary, should all be given a trial. Zwanck-Schilling's winged pessary is well

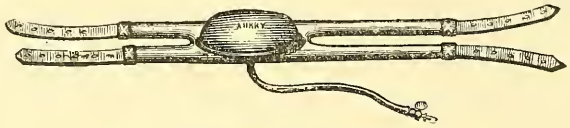


Fig. 269.—Perineal Air-Cushion.

known, but of little value [and so dangerous that it should be mentioned only that it may be avoided].

In order that any kind of pessary be of use, I repeat that a certain degree of tonicity in the perineum is essential, and a somewhat small vulvar opening. They are valuable in cases of cystocele, but fail when the uterus takes part in the prolapse. In any case, they should never be used except as a palliative measure, trusting to a radical operation for cure.

Nevertheless if the patient positively refuses surgical aid, or if it offer but small chance of relief, as in the case of complete prolapse in

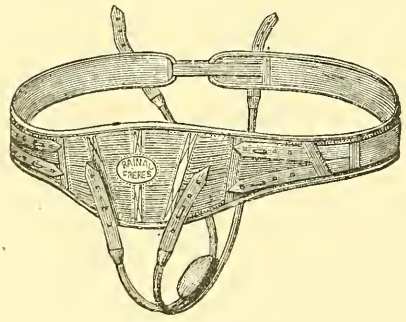


Fig. 270.—Belt with Perineal Pad.

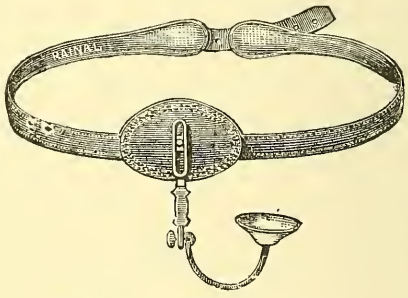


Fig. 271.—Basin-Shaped Pessary.

enormously stout women, with pendulous abdomen, whose vagina and uterus seem to have lost all connection with the pelvic cavity, the only resource seems to be a stem pessary [24] supported by a belt. Very similar varieties have been devised by Scanzoni, Gourty, and Grandcollot (Figs. 271 and 272). The Dumontpallier pessary may be fixed to a stem which has an abdominal support, but the ring must be very unyielding to be of use. Borgnet's cork pessary recommends itself, especially for hospital use, by its simplicity of construction, its solid-

ity, and its cheapness (Fig. 273). Whatever the pessary used, its insertion should be preceded by a reduction of the prolapse, and treatment tending to diminish the congestion of the parts. If there be œdema or inflammation, the patient should be kept in bed; frequent baths and prolonged tepid vaginal injections are to be given, tampons applied, and massage administered. As soon as the tissues have

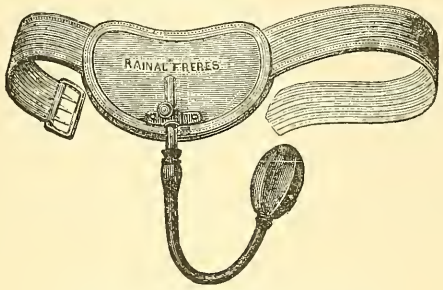


Fig. 272.—The Roser-Scanzoni Pessary.

lost some of their rigidity, reduction of the prolapse is attempted, the patient being in the Sims or else the genu-pectoral position, both of which favor the entrance of air into the vagina. The bladder and rectum must be empty. If much difficulty be experienced in restoring the prolapsed organs to place, it is better to wait patiently, and not use force.

[Much may be accomplished in the prophylaxis of these displacements by the avoidance of any exertion during the puerperium; confinement to bed until involution is well under way; the avoidance of

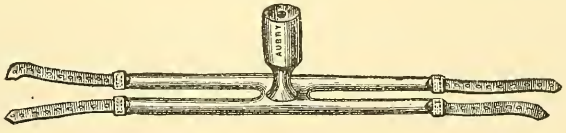


Fig. 273.—Borgnet's Pessary.

constipation or the use of clothing which compresses the waist, and the immediate suture of perineal lacerations. Any relaxation of the vaginal tissue should be treated by hot astringent injections. Chronic cases of slight degree are benefited by the tonic effect of the hot douche and by astringent tamponade, and according to many writers by elevation of the uterus and massage by Thure Brandt's method. Pessaries in general are unsatisfactory, as stated above, though many cases of *cystocele* receive great benefit and relief from the pessary devised by Gehrung (Fig. 274). This instrument, while most efficient, needs to

be carefully fitted, and is difficult to adjust unless fully understood. As it sustains a considerable weight, it must be watched to see that its superior bar does not cut into the vaginal wall. It is inserted as follows: Place the pessary on a table, with the superior arch (*S*) below and the inferior (*I*) above, the curves *R* and *L* pointing toward you. Take the pessary by curve *L* with the right hand and insert curve *R* into the vagina to the right of the patient until three-fourths of the instrument is buried within. Then push curve *L* toward the fourchette and the left side of the patient, so that it slips into the vagina at the same time that *S* turns upward in front of the uterus and *I* under the pubic arch. The curves *R* and *L* should rest squarely on the posterior vaginal wall, while *S* and *I* support the rectocele between the uterus and symphysis.]

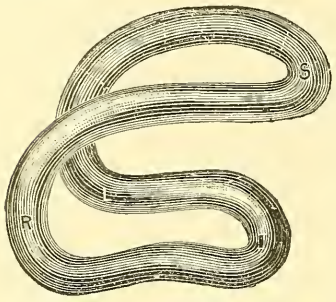


FIG. 274.—GEHRUNG'S PESSARY FOR CYSTOCELE.

Surgical Treatment.—This offers so much chance of relief, and is attended by so little danger, that it ought to be much preferred to the use of pessaries.

The various methods used may be thus classified:

1. Support derived from the vagina, vulva, or perineum.
2. Uterus raised by shortening the round ligaments.
3. Uterus sutured to neighboring structures (hysteropexy) through the vagina or by means of a laparatomy.
4. Hysterectomy.

Before going into the details of these various operations, we must devote a few moments to the consideration of a valuable preliminary operation, designed to favor the replacing of the uterus when the cervix is hypertrophied, viz., amputation of the cervix. Instead, however, of following Huguier's method without reference to subsequent reunion, we should always try to bring the mucous lining together, after the excision of a conoidal portion of each lip (Fig. 275).

We may avoid wounding the bladder by introducing a male catheter into it, which is to be held by an assistant, and which will serve as a guide; the peritoneum posteriorly and the rectum may be preserved from injury by keeping the cutting edge of the bistoury constantly turned toward the part to be excised. The vaginal mucous membrane may be sutured to that of the cervix, but in order to accomplish this it is necessary that the segment of the cervix removed

be not too large; indeed, it is not needful to remove more than a small portion, to insure the result aimed at (C. Braun).

I. Support Derived from Intra-vaginal Parts.—The great majority of operations for the cure of prolapsus come under this head. I shall merely enumerate those no longer used, reserving a detailed description for those whose use I recommend. (Schücking's method, and those of Freund and Péan, described in the chapter upon Retroflexion, are equally applicable to prolapsus.)

Among the old methods, I will name episiorrhaphy,[25] or suture of the labia majora, to contract the vulvar opening; freshening the surface and suturing of the vulvar opening;[26] infibulation by means of a metallic ring;[27] cauterization of the vaginal walls with various caustic agents,[28] or with the actual cautery;[29] all detestable methods, that

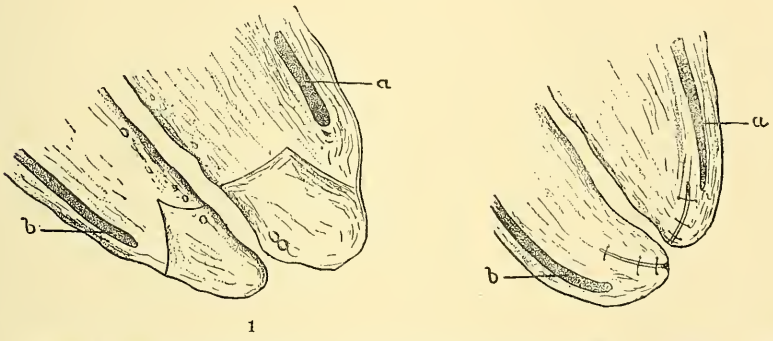


FIG. 275.—UTERINE PROLAPSE; amputation of the vaginal portion of the cervix. 1, before the suture; 2, after the suture; *a*, bladder; *b*, Douglas' cul-de-sac.

have recently been recalled to our notice. I have the same opinion of treatment by ligation.[30] Franck[31] performs an operation whose object is the formation in the vagina of a vertical fold, projecting anteriorly like a tampon. He dissects up the vagina almost to the posterior cul-de-sac, and with buried catgut sutures forms the spur-like projection. This is, however, not the only result of this operation, which is a species of colpo-perineorrhaphy.

Elytrorrhaphy or colporrhaphy, the excision and suturing of a portion of the vaginal wall, was first introduced by Marshall Hall.[32] His operation, although incomplete, served as the starting-point for the perfected operations of colpo-perineorrhaphy and perineauxesis of the present day, which follow the plan of procedure initiated by Simon,[33] who was the first to realize the importance of freshening a large surface of the perineum as well as of the vagina. His denudation was in the form of a trapeze. Colporrhaphy, or anterior elytror-

rhaphy, was first done by Sims.[34] Since Simon's day, the size and shape of the denudation in this operation has been indefinitely varied. I shall describe only the methods of Hégar and A. Martin, and Doléris' for perineoplasty, besides Le Fort's operation for closure of the vagina.

Colpo-perineorrhaphy (Hegar's method).—The patient's bowels and bladder are to be evacuated, and she is to be thoroughly washed, after which she is anæsthetized and placed in the dorsal position. The

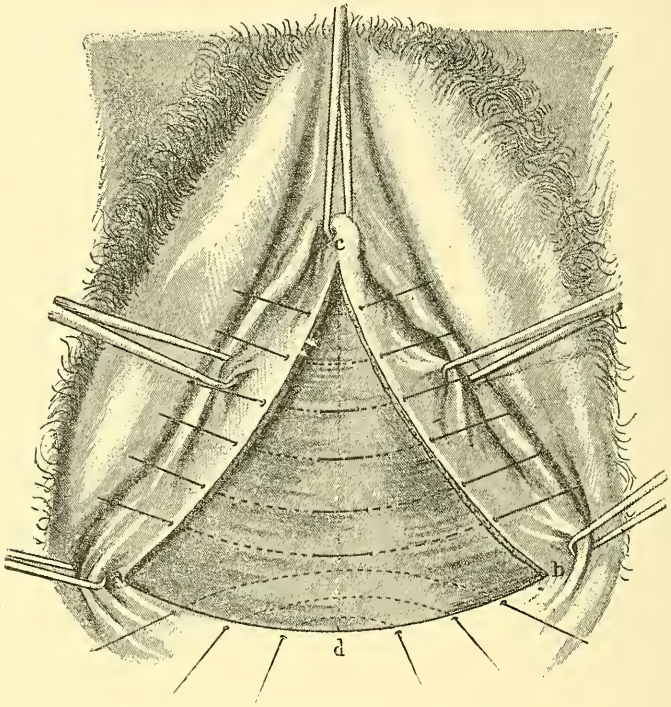


Fig. 276.—Colpo-Perineorraphy by Hegar's Method.

extent of surface to be denuded is determined by grasping the posterior wall of the vagina with the forceps and drawing it into view. In cases of minor importance, it will be quite sufficient to make a denudation in the shape of an isosceles triangle—about two inches broad at the base (which is at the fourchette) and about two inches long. When the prolapsus is very great, we may add from a quarter to half an inch to these measurements. During the operation, continuous irrigation should be practised; the stream of tepid water should be slow, and should consist of either a weak antiseptic solution (carbolic acid 1%), or of filtered water with salt, 6:1,000.

One assistant will administer the chloroform, two will hold the thighs and the forceps, while a third will hand the instruments.

Retractors are of small use in bringing the parts to be denuded into view. A blade of a speculum temporarily pushes up the anterior wall of the vagina, and the surgeon grasps the posterior wall with tenaculum forceps, about two inches above the fourchette, at a point which is to constitute the apex of the freshened surface. The labia are separated and two forceps placed at the ends of the base of the triangle at the lower extreme inferior limit of the vagina and about two inches apart.

Two additional forceps mark the middle of the sides of the triangle. When the assistants hold out all these forceps, the operating field is conveniently spread before the surgeon. With a sharp-curved bistoury he outlines the triangle, making the base slightly concave, and the sides very sightly convex to the centre. The mucous membrane is now grasped at the apex with mouse-toothed forceps, and dissected sufficiently to allow of the finger replacing the instrument, strong traction being at the same time exerted upon the detached membrane to facilitate its dissection. If the recto-vaginal septum be very thin, it is well to avoid the danger of puncturing it, by introducing a finger through the anus. In view of the possibility of this procedure, the rectum should have been previously subjected to a thorough cleansing with boric or salicylic acid solutions; the assistant who attends to this preparatory measure must thoroughly disinfect himself after its application. If there be hemorrhage, the bleeding points are to be seized with forceps. The whole thickness of the mucous membrane, which has often undergone hyperplasia, is to be stripped off, and the surface of the wound is to be made thoroughly smooth with curved scissors. Perforation of Douglas' cul-de-sac has not infrequently occurred during this operation. Schauta[35] seized the opportunity offered by this accidental opening to draw down and resect the peritoneal cul-de-sac. This manœuvre is somewhat similar to Freund's operation, which I have described on p. 558.

For the suture, Hegar uses silver wire, which he introduces under as much of the surface of the wound as possible, adding a few superficial sutures between these deeper stitches.

It seems to me preferable[36] to use the continuous buried catgut suture.

Colpo-perineorrhaphy or perineauxesis (Martin's method).—Martin's chief object in this operation is to save the posterior column

of the vagina, which is the most resistant portion, and which Freund [37] first pointed out as a part to be carefully handled in all plastic operations. Besides this, the denuded portion, while quite as extensive as in Hegar's operation, instead of forming one continuous surface, consists of several segments in close juxtaposition, which allows of more accurate suturing and more perfect union.

Having taken the same preliminary measures as in the former operation, Martin grasps the posterior wall of the vagina, just below

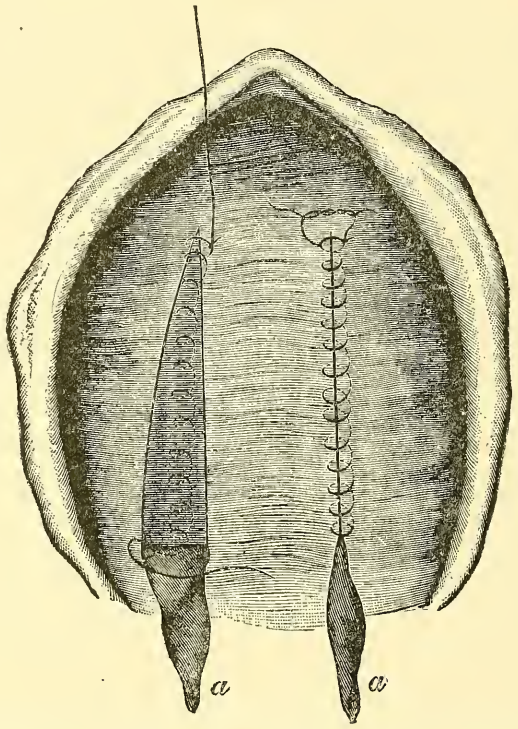


Fig. 277.—Colpo-Perineorrhaphy by Martin's Method. Bilateral denudation of posterior vaginal wall. Continuous suture in layers.

the cul-de-sac, with two pairs of tenaculum forceps, which forcibly stretch it so that the vaginal column (columna rugarum) has the appearance of a long, projecting fold. An incision is made with the bistoury on either side, and two narrow lateral strips are dissected off as far as a finger's breadth above the fourchette. Tenaculum forceps are applied to both extremities of these freshened surfaces to keep the operating field as tense as possible. These two small wounds are now sewed up by a continuous suture in layers (Fig. 277), the forceps are removed and the first step in the operation, double lateral

elytrorrhaphy, is now completed. The second step, perineorrhaphy remains to be done.

A transverse incision is made at the muco-cutaneous junction, which intersects the column of the vagina, and ascends on either side to about half the extent of the vaginal opening [to the inferior caruncles]. From the extremities of this incision a second concentric incision, forming an acute angle with it, intersects the lower part of the vertical

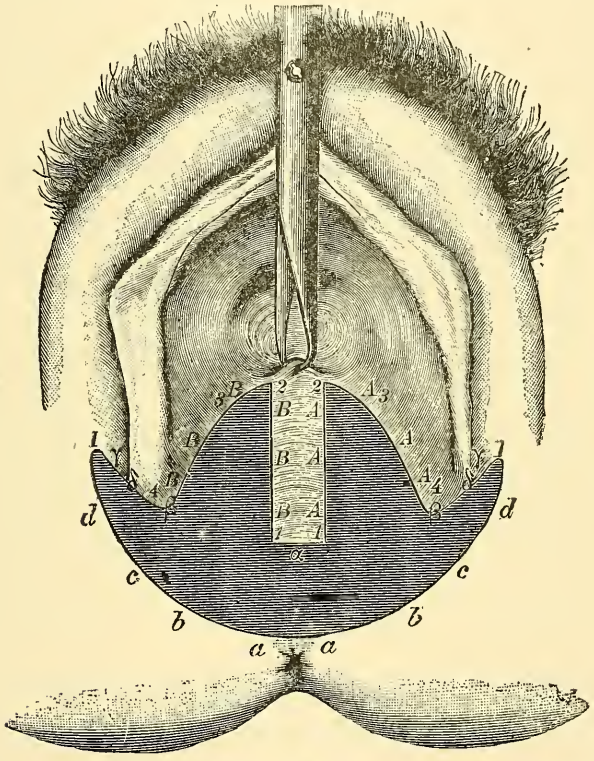


FIG. 278.—COLPO-PERINEORRHAPHY BY MARTIN'S METHOD, SHOWING DENUDED SURFACE. 1, 2, Incisions by the side of the posterior vaginal column; 3, 4, Incision upon the lateral wall of the vagina; *I*, Extremity of denuded surface, at the level of the vulvar opening; *A-A*, *B-B*, *a-a*, *b-b*, *c-c*, *d-d*, *β-α-β*, *δ-δ*, *γ-γ*, indicate the points which will be in contact after the suture.

incisions made in the elytrorrhaphy. The result is a semilunar transverse strip whose concavity is turned upward in a condition of rest (Fig. 278), but which, when pulled upon at its ends, becomes lozenge-shaped. This strip is now denuded, and the surface reunited by a continuous catgut suture in layers as in Fig. 279.

Martin uses a trowel-shaped bistoury for the dissection of these strips of membrane, rolling them up on a slender staff with lateral teeth

(*râteau*). It seems to me that an ordinary curved bistoury and long forceps are equally good. Bischoff[38] has adopted a method which, like Martin's, preserves the normal condition of the vaginal column (Fig. 280). Winckel[39] denudes the lower third of the vagina for about an inch above the remains of the hymen, and laterally to 1.5 inches from the meatus, making first a vertical median incision and separating the mucosa so as to form lateral flaps. He then brings the

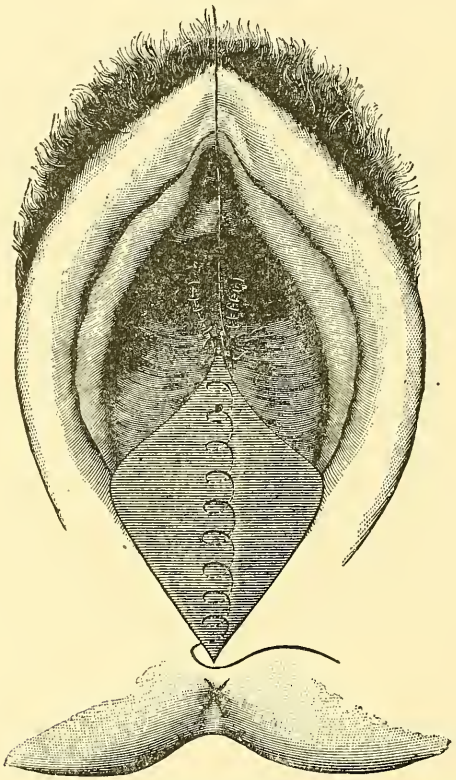


Fig. 279.—Colpo-Perineorrhaphy by Martin's Method. Continuous suture in layers, of the denuded perineal surface (deep layer of stitches).

freshened surfaces into apposition vertically, as in Martin's operation, and after shortening the two flaps one half, sutures them so that they form a bridge across the remainder of the denudation.

Colpo-perineoplasty by Flap-splitting (Doléris'[40] method).—This is an ingenious combination of Lawson-Tait's flap-splitting, Schröder's removal of the mucous membrane, and Emmet's suture, and is chiefly applicable where the uterine prolapse is only slightly marked, but where the vulva gapes so widely that there is danger of vaginal

prolapse, with or without partial laceration of the perineum. It strengthens the perineum by increasing its length and thickness, without any vaginal suture, and is rapidly performed. The weak point of the process is the shortening of the posterior vaginal wall, which interferes with any ascent of the uterus, and thus renders it of doubtful utility in cases of marked prolapse. It cannot be combined with Alexander's operation, as can Hegar's and Martin's methods. Moreover, it does not contract the vagina itself, but only the vulvar orifice, and is in fact merely a perineoplasty, since the portion of vagina removed is very small. With a bistoury, Doléris makes a deep

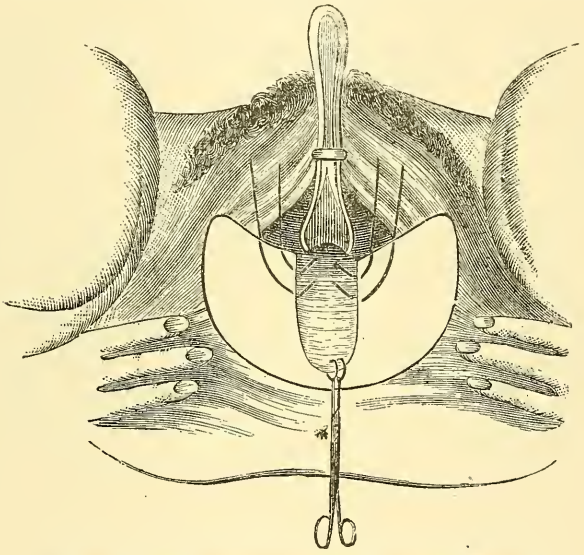


Fig. 280.—Colpo-Perineorrhaphy by Bischoff's Method.

curved incision at the juncture of skin and mucous membrane. Forceps are inserted at the two ends of the incision, to stretch the tissues. The upper, mucous lip of the wound is dissected slightly from the submucous tissue, and then uplifted by forceps. The operator, now using the index finger of the left hand instead of an instrument, gently pushes the tissues apart, separating the vaginal and rectal walls as far as necessary. The vaginal flap is now drawn outside of the vulva and resected, and its edge then united to the edge of the first incision with curved needles and three strands of heavy silkworm gut. The first stitch is in the centre; it is inserted just to the left of the anus, goes deeply through the tissues, and into the vaginal flap close to the wall, entering the vagina or not as the operator prefers;

it is then brought back in the same manner to the right side. This first suture brings the vaginal wall near the vulvar commissure, also serving to unite the cutaneous lips of the wound. The second and third sutures are inserted in the same way, each slightly outside the other. The portion of the flap in excess of the reconstructed fourchette is now cut off, and the mucous and cutaneous lips united.

While *colpo-perineorrhaphy* is the chief operation for prolapse of the genital organs, it needs often to be supplemented by other opera-

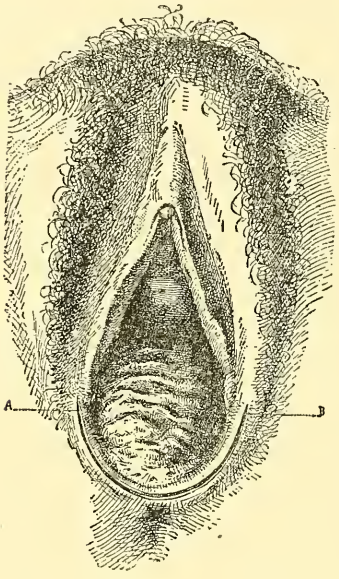


FIG. 281.—COLPO-PERINEOPLASTY BY FLAP-SPLITTING (GLISSEMENT). Doléris' method. Semicircular incision following the outline of the posterior vulvar commissure, at the point of union of skin and mucous membrane, from *A* to *B*.

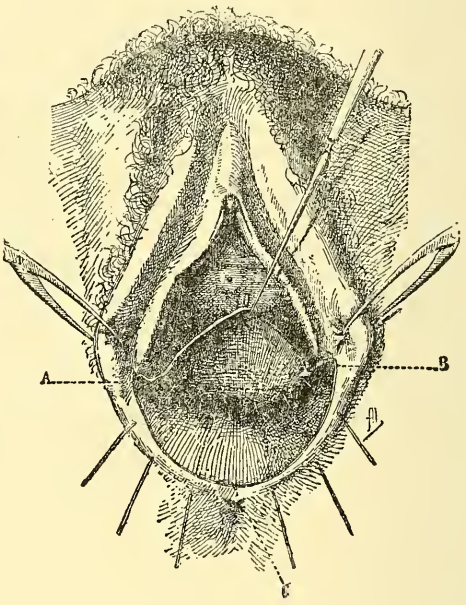


FIG. 282.—COLPO-PERINEOPLASTY BY FLAP-SPLITTING. Dissection of vaginal flap, *A*, *B*, *D*, by bistoury and fingers. Insertion of three stitches which are to bring the under surface of the flap into apposition with the cutaneous lip of the wound.

tions, as amputation of the cervix, already described, and anterior colporrhaphy or elytrorrhaphy. The object of the first is to facilitate the restoration of the uterus, while the latter acts directly upon the procidentia of the anterior wall. Anterior elytrorrhaphy was performed by Sims, whose denudation was in the shape of a horseshoe, with its convexity toward the urethra. Emmet made it trowel-shaped. Hegar advises an ellipse, with as blunt an upper end as possible. As a rule, it is folly to waste time in trying to obtain a flap of any special shape: the exuberant portion of the vagina is simply to

be excised. I find it convenient to take up a fold of mucous mem-

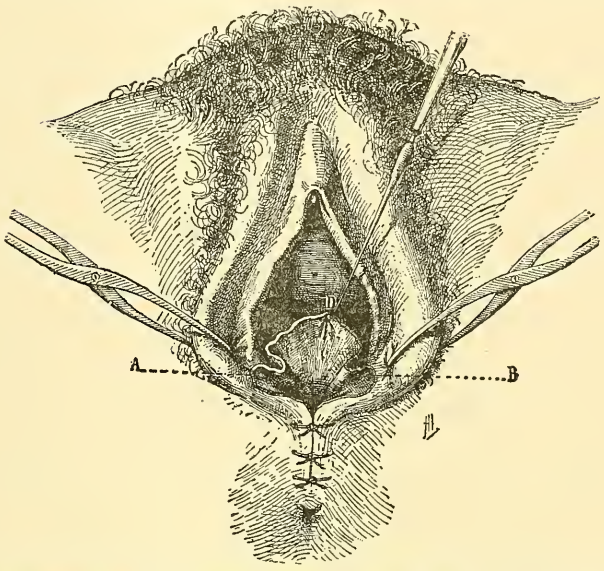


FIG. 283.—COLPO-PERINEOPLASTY BY FLAP-SPLITTING. Stitches drawn. The flap *A. B. D*, lifted; to be resected on the line *A* to *B*.

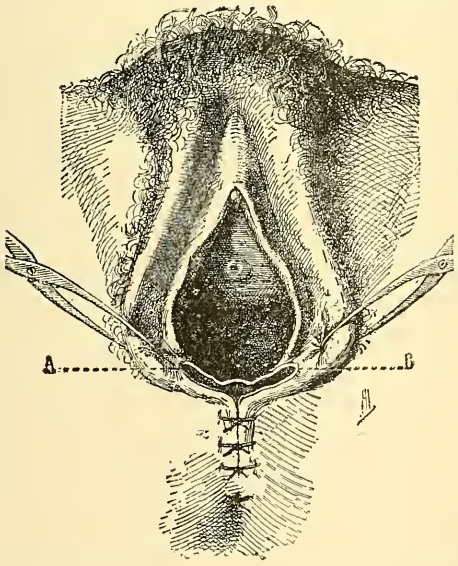


FIG. 284.—COLPO-PERINEOPLASTY BY FLAP-SPLITTING. The flap has been excised; two lateral openings are still unsutured.

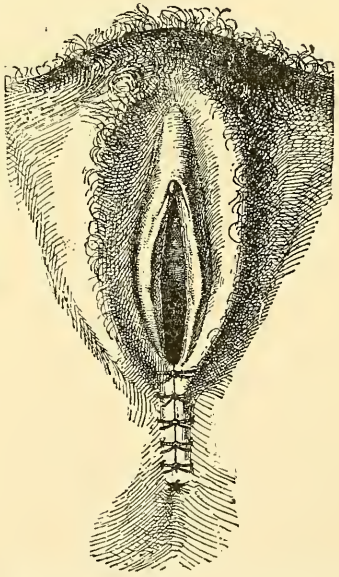


FIG. 285.—COLPO-PERINEOPLASTY BY FLAP-SPLITTING. Suture completed. Stitches all on external surface.

brane with two or three tenaculum forceps, the highest placed about an inch from the cervix, and the lowest 1.5 inches from the meatus. A

pair of strong and long curved forceps, or if necessary two pairs (Fig. 286), are now placed upon the fold [care being taken to avoid inclusion of the vesical wall]; the bladder will not be injured by even very strong traction. Hegar places silver-wire sutures below the forceps (or clamp) before exsection of the vaginal fold. I prefer a continuous suture in layers. I cut off the mucous fold, stretch the

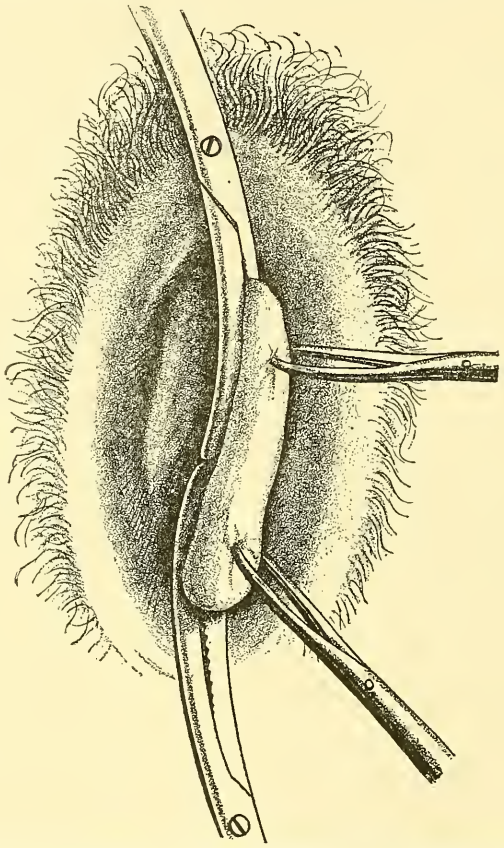


Fig. 286.—Anterior Elytrorrhaphy. Forceps grasping a fold of vaginal mucous membrane.

tissues by means of forceps (Fig. 287), and insert the sutures according to the method described on page 49.

Stolz [41] has devised a very ingenious method of suturing in anterior colporrhaphy. After freshening an oval surface similar to that shown in Fig. 287, two curved needles are threaded on a silk suture, one needle at each end, and beginning near the cervix the suture is passed in and out of the whole circumference of the wound, about half an inch from the edge something like the draw-string of a tobacco

pouch (Fig. 288). The denuded surface is pushed inward toward the bladder and the ends of the silk closely drawn and tied. This was the most expeditious procedure known before the use of the continuous suture in layers, which should be given the preference. Stolz freshens the anterior vaginal wall with curved scissors, after rendering it

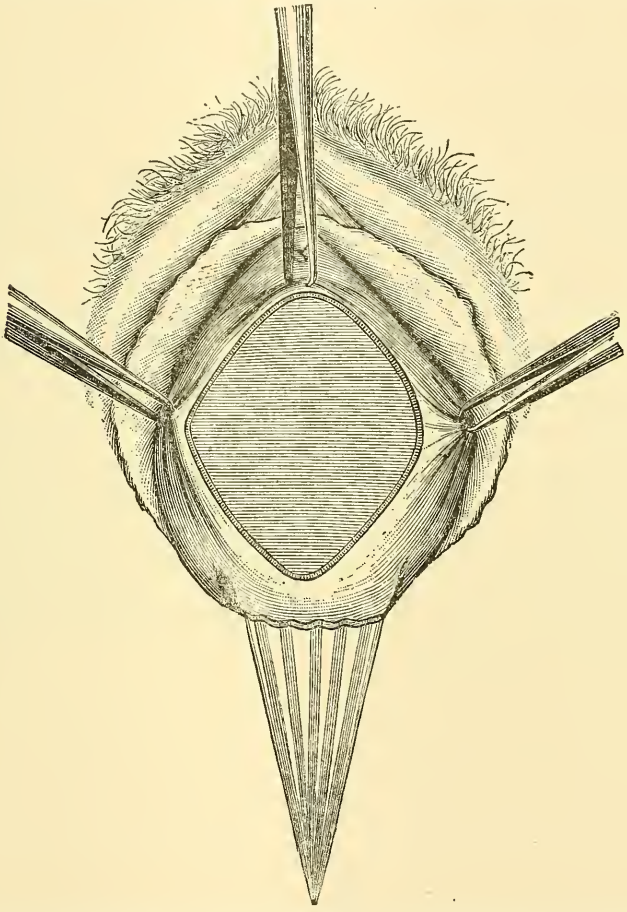


FIG. 287.—ANTERIOR ELYTRORRHAPHY. Flap removed. The raw surface, stretched out by forceps, is to be united by a continuous suture in layers. At the lower part of the picture is the bundle of stitches from the suture of the amputated cervix.

prominent by the pressure of a thick sound introduced into the bladder.

Closure of the Vagina (L. le Fort's method).—Le Fort[42] calls attention to the fact that the prolapse of the uterus is almost always preceded by that of the vagina, the walls of which fall, as it were, from a straightening out of their folds. If, he reasoned, these walls which

face each other could be joined together, all prolapse would be prevented. The next step was the uniting of the walls by suture after freshening a longitudinal strip on each (Figs. 289 and 290).

Sometimes the prolapsed uterus becomes so enlarged that it is difficult to restore it to place at once. That the reduction of the displacement may be effected by degrees, the patient is kept in bed from eight to fifteen days, after which the passive congestion has subsided in whole or in part, and the uterus is diminished in size. By straining, it is made to emerge again from the vulva.

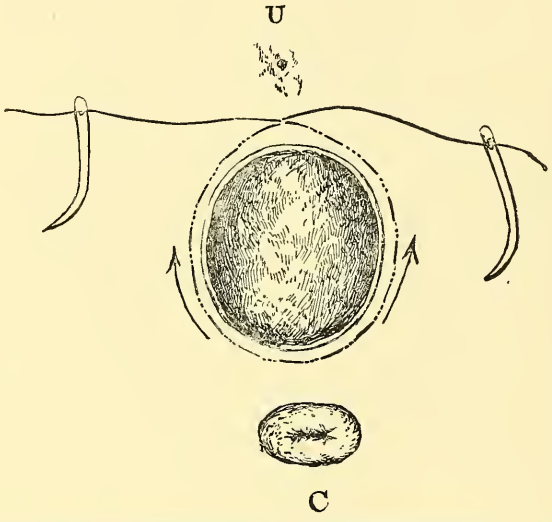


Fig. 288.—Stoltz's "Tobacco Pouch" Operation for Cystocele (Mundé). *C*, cervix; *U*, Urethra.

The freshened surface should begin as near to the vulva as possible, since it is in this situation that the anterior and posterior walls tend to separate most widely and thus permit of a prolapse. If one operates too near the cervix, it may be difficult to approximate the surfaces on account of the size of the uterus. As a usual thing, the surgeon first replaces the uterus, opens out the vulva, and with a bistoury makes two transverse incisions, one upon the anterior and the other upon the posterior wall of the vagina, at the lowest point where these two walls meet (the uterus being in place). These two incisions form the lower borders of the two denuded surfaces.

The vertical length of the freshened surface is from 2.1 to 2.5 inches, the vaginal walls having been unfolded and stretched by the prolapse of the uterus which was induced by straining just before the operation. The breadth of the freshened surface first advised by Le

Fort was from a half an inch to three-quarters of an inch. At the present time he makes it about an inch wide. If the surface be too large, it will interfere with perfect union. The tissue taken off should be as thin as is compatible with the exposure of a raw surface. The removal of the whole thickness of the vaginal portion of the posterior wall would endanger the cul-de-sac. Tillaux perforated it once, and the patient died of peritonitis, but Le Fort thinks this the only time that such an accident has occurred. He usually begins by making four incisions to outline the flaps and thus facilitate their dissection.

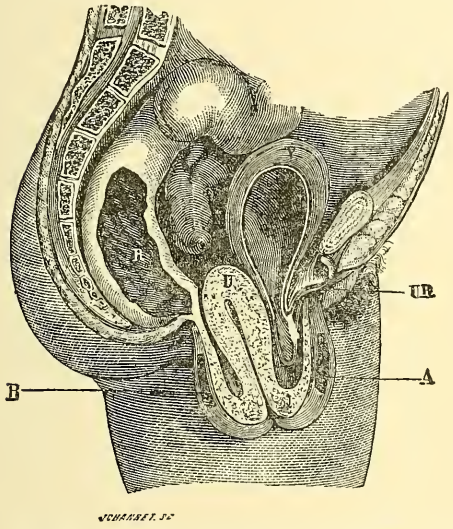


Fig. 289.—Le Fort's Operation for Closure of Vagina. *R*, rectum; *U*, uterus; *ur*, urethra; *A*, anterior denudation; *B*, Posterior denudation.

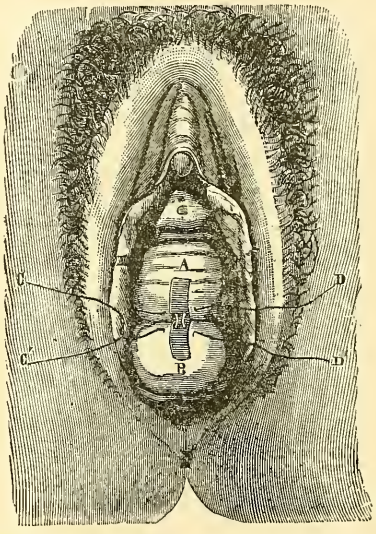


Fig. 290.—Le Fort's Operation for Closure of the Vagina. *A*, denuded surface upon the anterior wall of the vagina; *B*, denuded surface upon the posterior wall of the vagina; *C*, *C'*, a suture on the left side; *D*, *D'*, suture on the right side.

In the early days of the operation, Le Fort used silver wire for the suture; and although it is difficult to find the stitches afterward, even when the ends are long enough to hang outside the vulva, he still uses them, for he had two failures with silk which irritated and inflamed the tissues. He several times tried the experiment of passing the sutures only through the edges of the wound, but met with small success; in such a case, if the freshened surface be of any size, the central portion does not unite, blood collects in it, and the operation is a failure. It is now his custom to pass the sutures to the very centre of the denudation. The first one is inserted at the middle portion of the end of the denuded surface nearest to the uterus, this stitch serving as the

support to the prolapsed uterus. When the surfaces *A B* are once in apposition from the return of the uterus to its normal position, all that remains to be done is to suture the edges. The needle is inserted into the mucous membrane of one of the vaginal walls, traverses the wound, and enters into the other denuded surface, emerging at the mucous membrane of the opposite vaginal wall. The sutures are left in place two weeks, or even three weeks at times, and no attempt is made to remove them until certain perfect union has been secured. No dressings are necessary.

Out of forty operations, André [43] records thirty-five successful results, of which thirty-one were successful immediately. It is an interesting fact that this operation does not interfere with coition, fecundation, or labor. One of the first patients upon whom Le Fort performed this operation went through a perfectly normal labor. To deliver the child, it was only necessary to cut the artificial frenum with the scissors.

After-treatment of Colpo-perineorrhaphy.—The care of the patients, after these plastic operations for strengthening the perineum and narrowing the vagina, has an important bearing upon primary union; should this primary union fail, the success of the operation will be endangered, in spite of cases quoted to prove that granulation or immediate secondary union have given excellent results.

The line of suture is to be dusted with iodoform and covered with iodoform gauze. The catheter should not be left in the bladder, as there is danger of its causing cystitis, but, if the patient be unable to pass her urine spontaneously, an aseptic catheter may be introduced every six hours. Shall the bowels be rendered constipated or loose? I consider it best to prevent defecation until the fourth day, and then to give an enema. The patient will of course have been thoroughly purged, and the rectum washed, before the operation. Two tablets of opium daily, one-third of a grain each, will be quite sufficient to prevent premature evacuations if the diet be light. Should the patient still feel a desire to defecate, a suppository containing 1.4 grains of the extract of opium may be used. On the tenth day it is my custom to administer an ounce of castor oil, and two hours later an enema of four teaspoonfuls of the oil of sweet almonds with two of glycerin. After this, the bowels are closely watched to insure regular daily movements. The patient is to keep her bed for a month.

Immediate and Remote Results of the Operation of Colpo-perineorrhaphy.—Those gynæcologists who have the most frequently

performed this operation are unanimous in testifying to its safety and efficacy. In what follows, I refer more especially to the operation of Hegar, which seems to me the most practical, and to that of Martin, which is of the greatest use where the vaginal walls are exceptionally loose and flabby; in this latter case Hegar's method, if used, would have to be preceded by an elliptical posterior elytrorrhaphy, as he himself admits.[44]

The accidents to be feared are: Puncture of the peritoneum, which, if the operation be conducted under strict antisepsis, is not of grave import; wounding the rectum, which a well-applied suture will remedy; suppuration and destruction of the suture, which may be avoided by a careful preparation of the catgut and the minutest precautions against possible infection. Out of 400 cases operated upon in his clinic, Hegar has seen but 2 deaths from septicæmia, and in both cases it was ascertained that the infection was carried from cases previously operated upon. Dorff,[45] who is Hegar's assistant, has published an interesting series of statistics upon the remote results of 136 operations. He was able to secure positive information in only 63 of the cases; of this number 53 reported a perfect cure (some after a lapse of ten years), 9 reported successful parturition without subsequent relapse; in 10 patients the operation had failed, either in the first place or at a later date, in 2 of them after labor. The immediate results are even more gratifying: For a period of three years and a half, during which he has performed this operation 150 times, Hegar has not had one failure.[46] Ernest Cohn,[47] in a scholarly treatise upon the cases in Schröder's clinical and private practice, reports that of 74 women whom it was possible to keep under observation after the operation, 46 were permanently cured; tha tis, 67.5%. Hospital cases alone give 56%, and clinical cases report 86.7%. (These are all cases where Hegar's method was employed with a continuous suture in layers, using catgut prepared in oil of juniper.) Three of the patients went successfully through labor.

II. Shortening the Round Ligaments for Prolapse of the Uterus.—This is the Alquié-Alexander-Adams operation. For a detailed description the reader is referred to the chapter on Retroflexion (p. 452). The success of this operation alone, when performed for the relief of prolapsus, is not in the main brilliant, although some good results have been reported.[48] But it is of undoubted usefulness when combined with plastic operations upon the perineum and vagina, especially in thin women whose abdominal walls are not too lax. It

seems to me that its chief action is the correction of the retroversion which accompanies and is a prominent feature of prolapsus.

III. Suture of the Uterus to the Abdominal Wall—Ventro-fixation.—The history and description of this operation are given in the preceding chapter (page 460).

If an abdominal tumor, fibroid or cystic, complicate the case, it will be an excellent procedure after laparatomy to fix the pedicle into the wound. One of my patients was cured by this procedure after an ovariotomy. Schröder quotes similar cases; and analogous facts are reported by Olshausen, Brennecke, Weist, etc. (See history of Ventro-fixation, page 460).

It is important to remember that ventro-fixation is not adapted to the cure of prolapse of the genital organs in toto, but only to prolapse of the uterus itself. Unless this have fallen, it would not be justifiable to fix it to the abdominal walls simply because of the existence of a cystocele and rectocele. Neither would ventro-fixation alone suffice to cure a prolapse of the uterus if it were accompanied by prolapse and distention of the vaginal walls and a supra-vaginal hypertrophy of the cervix. From a theoretical as well as a practical point of view, this operation is adequate only in those relatively rare cases where an unenlarged uterus alone is prolapsed. In all other cases, supplementary operations upon the cervix, vagina, or perineum will be found necessary; the conoidal amputation of Huguier, or bi-conical amputation of Simon; anterior and posterior elytrorrhaphy, the various forms of colpo-perineorrhaphy, Le Fort's closure of the vagina, etc.

It would seem then that ventro-fixation possesses no advantages over Alexander's operation, which is also rarely adequate in complicated cases, but a very valuable auxiliary. It is really between these two operations that a comparison should be instituted, from the point of view of both danger and efficacy. It is unnecessary to dwell upon the first point, the relative safety of Alexander's operation being well known. This fact does not by any means settle the question of a choice, but it should influence the conscientious surgeon not to resort to the more serious operation before having tried the less serious one. As to the question of efficacy, experience will not as yet justify a judgment in favor of gastro-fixation, as the operation has too recently come into prominence and has been too seldom performed.

The first patient operated upon by Olshausen[49] had a speedy return of the displacement, but it would seem that in her case the

sutures were insufficient (two stitches of silkworm gut at the insertion of each round ligament). The second operation by the same surgeon, where fixation was superadded to an ovariotomy, was successful, the patient reporting a complete cure in 1886, a year and a half after the operation. Phillips[50] reports a case where the cure had lasted for six months, the last observation being taken at the moment of publishing the report; in this case also the pedicle of a removed ovary was fastened to the abdominal wall. Dumoret[51] reports eight successful cases out of eleven such operations. Terrier's three cases and those of Tuffier[52] are of too recent date to add much to our knowledge of results. Two failures and one death are facts not to be overlooked, and scarcely justify the enthusiasm displayed by some surgeons over this operation. Foreign operators do not seem to favor ventro-fixation for prolapsus. Kelly[53] disputes its value. Müller has performed it from twelve to fifteen times without good result, the prolapse of both uterus and vagina soon recurring. In some cases, the adhesions to the abdominal walls have given way; in others they have remained, but the walls have been dragged down out of place. Hofmeier has seen no good results from Schröder's operations; Freund, to explain these failures, calls attention to the fact that even after a myomotomy with extra-peritoneal fixation of the pedicle, the latter often becomes detached from the abdominal wall. Fehling, out of three cases, had one successful result.[54]

Moreover, if there be much hypertrophy of the cervix and vaginal prolapse, though the uterus be firmly fixed in place or even removed, the vaginal prolapse will return. This has happened where vaginal hysterectomy had been performed. Müller[55] (of Berne) has met with this deplorable result after the serious operation of abdominal supravaginal hysterectomy, with fixation of the pedicle in the abdominal wound. The woman was thirty-eight years of age, had had one child, and suffered from complete prolapsus of the uterus. Müller had performed Bischoff's operation of colpo-perineorrhaphy upon her in December, 1878, but without good results. June 16th, 1879, he made an incision in the linea alba about 2.5 inches in length, and by means of a sound in the uterus brought this organ into the abdominal opening, placed a clamp upon it and excised the upper portion, suturing the lower portion to the lips of the external wound. The patient left her bed on the 16th of July, cured. In November of the same year her menses had returned twice, as a sanguineous oozing through the vulvar and the abdominal cicatrix. The latter was much depressed, or rather

was at the base of a narrow infundibulum—formed by the abdominal walls. The uterine prolapse had returned in full force; the cervix protruding from the vulva about 3.5 inches. Its lips were swollen and admitted the first phalanx of the index finger. It seems to me that this case proves conclusively that support from above does not suffice to keep the uterus, or even a stump of the uterus, in place when a hypertrophied cervix and prolapsed vagina are continually pulling upon it from below. Ventro-fixation, like Alexander's operation, unless the case be one of simple uterine prolapse, should always be combined with an operation upon cervix, vagina, or perineum if durable results are to be obtained.

We might rank with ventro-fixation a new procedure described and performed by H. T. Byford[56] for the cure of cystocele, and which he proposes to use as a complement to Alexander's operation, utilizing the same incision and carrying it more deeply into the cellular tissue in order to suture the vagina. Byford carries the incision through the inguinal canal to the retro-pubic cellular tissue (cavity of Retzius), which he separates from the pubis, being careful to ascertain the exact situation of the ureter by bimanual examination. He next passes a needle threaded with silkworm gut from above downwards through the vaginal wall into the left lateral cul-de-sac. The needle is then carried from below upward through the vagina about a quarter of an inch from the point of entrance and emerges through the inguinal wound. A loop of silkworm gut thus holds a small portion of the anterior vaginal wall; another suture is firmly embedded in the cellular tissue, the threads are drawn taut and tied over the inguinal canal and the incision upon the posterior wall of this canal is closed. The same operation is repeated upon the other side, and the vaginal wall is drawn up to the middle of the pubic bone, uplifting and supporting the bladder. Byford claims that it is of the utmost importance to include in the suture some of the vaginal mucous membrane in which the thread sinks and is gradually buried, thus imparting additional strength. When operating upon both sides, especial care must be taken not to bring the sutures too near the urethra, for fear of diminishing its calibre. The ureter also is to be avoided. Byford has twice performed this operation. The first time it resulted in a failure, which he attributes to a lack of experience in the details. The second operation was a success, although he inserted one suture only, on the left side. This second case, however, proves little or nothing. The patient had already had a vaginal hysterectomy per-

formed on her; and at the same time that he did the ventro-fixation, Byford also did a double elytrorrhaphy, besides Martin's colpo-perineorrhaphy. It is very probable that this last operation alone would have sufficed; at all events, it is difficult to decide how much of the credit belongs to the first operation. Byford calls his process colpo-cystorrhaphy, which seems to me a misnomer, since, although the bladder is uplifted, it is the abdominal wall, and not that organ, which is sutured to the vagina. Either laparo- or ventro-fixation is a better term.

IV. Vaginal Hysterectomy.—Except in case of fibromata, I consider abdominal hysterectomy unjustifiable. As to vaginal hysterectomy, though less severe than this, it is more serious than plastic operations, and should only be resorted to as an extreme measure. The vaginal prolapse may persist even after it has been done, and in spite of the removal of a large portion of the vaginal mucous membrane, so that a colpo-perineorrhaphy may still be necessary.

Leopold[57] has performed this operation, but does not recommend it. Müller performed it three times, and in two of the cases had to supplement it with a colporrhaphy. Baumgarten has witnessed the occurrence of vaginal hernia as a sequel. On the other hand, Kehrer[58] has used it successfully in the cure of a uterus prolapsed for the second time, and Robert Asch[59] reports no less than eight cases of hysterectomy for prolapsus in Fritsch's clinic. This surgeon combines an extensive resection of the vagina with this operation.

The therapeutic indications of the various types of prolapse of the genital organs may be thus grouped: We may employ pessaries or palliatives (page 494) after reducing the displacement by rest, baths, and tampons, and if necessary amputation of the hypertrophied cervix. Massage[60] has been much extolled of late as a remedy in most of the uterine affections, especially prolapsus. I think it destined to render real aid, when combined with baths and rest, in diminishing the size of the prolapsed parts and facilitating their replacement. Brandt recommends massage with two operators; one of them lifts the uterus by means of two fingers introduced into the vagina; the other places both hands between the uterus and the symphysis, and slowly presses the ends of the fingers as deeply as possible, lifts them and presses them down again about a dozen times. A daily application for about eight days will be sufficient. It would be useless to expect a permanent cure from this treatment. It will give only a temporary relief, and cannot replace a plastic operation.

In the consideration of curative treatment we must divide the cases into several classes.

1. Simple Prolapse of the Vagina without Hypertrophy of the Cervix or Marked Sinking of the Uterus.—Anterior elytrorrhaphy and colpo-perineorrhaphy (Hegar's method) if the vagina be much enlarged; when the cystocele is small, anterior elytrorrhaphy followed by colpo-perineoplasty by flap-splitting (Doléris' method) to increase the perineal resistance.

2. Vaginal and Uterine Prolapse with Hypertrophic Elongation of the Cervix.—Biconical amputation of the cervix, anterior elytrorrhaphy, and colpo-perineorrhaphy. Hegar's method is the one to be ordinarily employed, but Martin's method is to be used instead if the vagina be large and flabby, as more of the surface can be removed.

If the body of the uterus be much prolapsed, it will be better to shorten the round ligaments at once, after amputating the cervix, before attempting a plastic operation upon the vagina. This combination of several processes for the cure of prolapse of the genital organs, and in especial the union of Alexander's operation to colpo-perineorrhaphy, was first suggested by Alexander himself. Mundé[61] and Doléris[62] warmly praise this mixed method. It seems to me that shortening the round ligaments is of especial value in correcting the retroversion which frequently accompanies a prolapsus and is so powerful a cause of relapse. It may sometimes be necessary to do as many as five operations upon the same patient; but they are all simple and rapid of performance, as all may be accomplished within an hour, thanks to the time gained by the use of the continuous suture in layers. Should any of these methods fail, ventro-fixation may be combined with the vaginal operations.

When the prolapse of uterus and vagina is complete, and the fallen organs hypertrophied and replaced and maintained in position with great difficulty, when they have in fact apparently lost their connection with the pelvis, it will be quite justifiable to perform a vaginal hysterectomy, with extended excision of the vagina, followed by colpo-perineorrhaphy to diminish the vulvar opening.

3. Prolapse of Uterus and Vagina without Hypertrophy of the Cervix.—Shortening the round ligaments, then colpo-perineorrhaphy (Hegar or Martin's method, according to the condition of the vagina) or Le Fort's closure of the vagina. As every case of prolapsus is accompanied by endometritis, one will always begin by curetting.

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CHAPTER XX.

INVERSION OF THE UTERUS.

Inversion of the uterus may be defined as the turning in of the organ upon itself, so that the fundus which is pushed down like the end of a glove finger protrudes either into the uterine cavity or the vagina.

The first stage of that process usually escapes notice, and may indeed be only temporary in its duration. To attract the attention of the physician, the fundus must protrude through the cervix and form a tumor which touch or sight can appreciate. The various de-

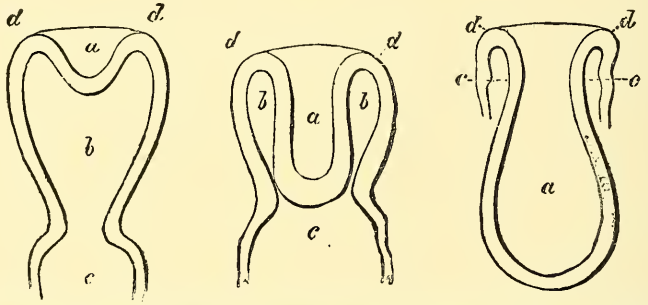

Fig. 291.—Inversion of Uterus. Schematic representation of the three degrees. *a*, Fundus inverted; *b*, in uterine cavity; *c*, in vagina; *d*, upper edge of the depression formed by the inverted fundus.

grees into which the classic authorities divided inversion (Fig. 291) have merely a theoretical interest. The division into complete and incomplete has not much more value; complete inversion, where any projection of the cervix is entirely obliterated, is so rare that the existence of even the few cases quoted is a matter of dispute.

The only classification of any clinical importance is that of simple inversion and of inversion with prolapsus.

Pathology—Etiology.—For the production of inversion, there must be a loss of tone of some portion of the uterus which excites the contraction of the uterine muscles just above it. These conditions are found after labor, or as the result of a fibroma growing into the cavity. In both of these conditions the uterus is hypertrophied and dilated; in both, a zone of its surface is inert and depressed. After

labor, this zone is at the placental site, so that Rokitansky[1] has described the affection as a "paralysis of the placental zone." In the case of fibroma it is at the site of the implantation of the tumor. Traction exerted from below upon the umbilical cord, or an impulse from above produced by exaggerated action of the abdominal walls when there is uterine inertia, may in this case depress the fundus. If the rest of the organ is then about to contract, the depressed portion is seized upon, as it were, and, by an automatic motion which may be

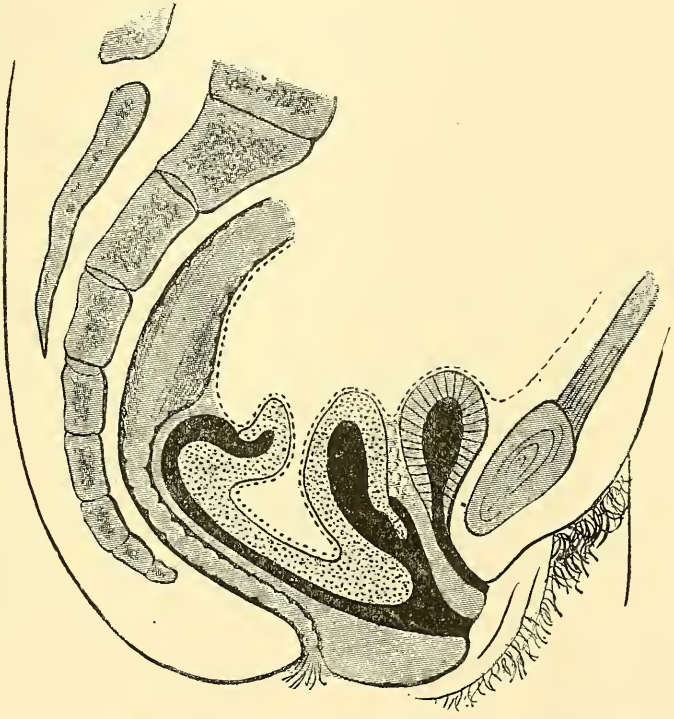

FIG. 292.—INVERSION OF THE UTERUS WITHOUT PROLAPSE.

compared to deglutition, carried down through the cervix. A slight inversion will give rise to contractions in a direction opposite to their usual one.

Among the more frequent causes we may mention: Shortness of the umbilical cord with excessive dragging upon the placenta; abnormal adhesion of the placenta or its insertion upon the fundus; labor in an erect position. Partial inversion often occurs without the knowledge of the attending physician, and the fundus which is cupped like the bottom of a bottle, to use Mauriceau's expression, continues to descend

in the first few days following parturition, and the inversion which occurred in the first moment is noticed only after a lapse of several days. Sometimes it becomes slowly appreciable, sometimes very suddenly. Its origin at the puerperal period is the most frequent. Crosse,[2] out of 400 cases of inversion, found that 350 were due to labor and 50 to polypus. Fibrous bodies, fibro-sarcomata in the fundus, especially if they have been subjected to traction, may cause an inversion even in nulliparæ. The existence of these tumors leads to a condition of

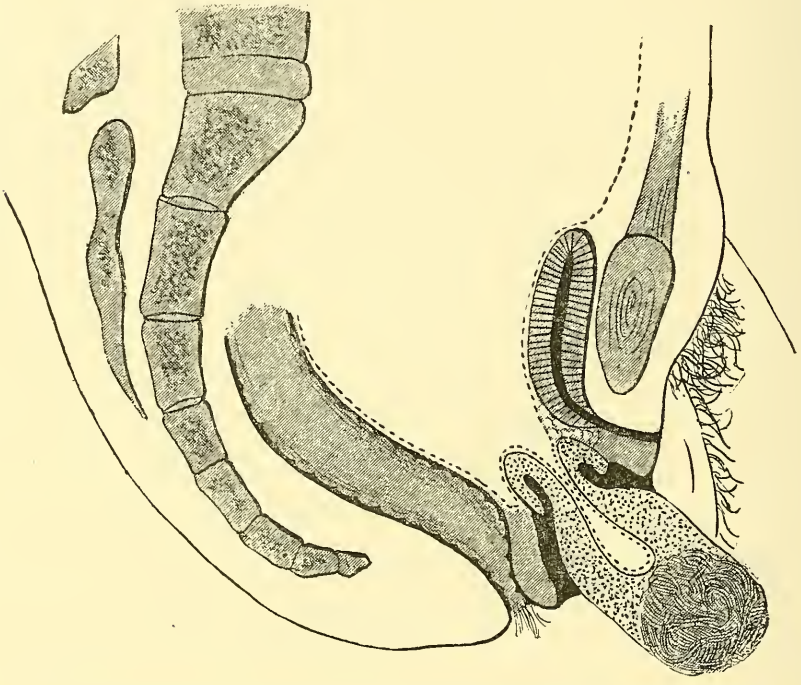

Fig. 293.—Inversion and Prolapse of the Uterus Caused by a Fibroid Tumor.

hypertrophy and vascularity bearing a close resemblance to the gravid uterus (grossesse fibreuse).

Inversion is a rare affection. According to Beigel's statistics, it occurs only once in 190,000 cases of labor.

Pathological Anatomy.—A marked distinction should be made between recent inversions in the puerperal state and chronic inversions in the same condition. The peculiar condition of the uterus at the moment of delivery establishes a radical difference between the two. Under the first head there is one variety which may be called acute and which is so formidable an occurrence that it may cause

death from profuse hemorrhage. It is fortunately so rare that I need not dwell upon it, but leave its description to the obstetrician.

By recent inversion I mean cases where the inversion constitutes the chief symptom to be treated, and may be made manifest to the surgeon at any time not too far removed from delivery (usually a month and a half) when the involution of the uterus is still incomplete. By chronic inversion I mean cases of much longer standing. In the recent cases the cup-shaped depression of the fundus is usually pronounced and contains the Fallopian tubes, the ovaries, and sometimes loops of intestine (Fig. 294). At a later stage this cavity disappears, leaving only a slit. The uterine tumor is large, its tissue spongy and vascular. The surface, which is soft and downy, is in

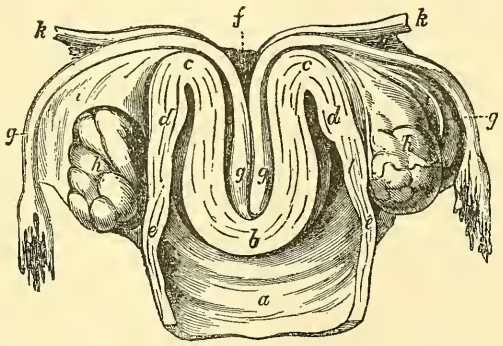

Fig. 294.—Inversion of the Uterus. *a*, Vagina; *b*, fundus; *c*, *c*, upper borders of the inversion; *c*, *d*, portion of cervix not inverted; *f*, cul-de-sac formed by the inversion of the fundus; *g*, *g*, Fallopian tubes dragged downward by the inversion; *k*, *k*, round ligaments; *h*, *h*, ovaries; *i*, *i*, broad ligaments.

contact with the vaginal mucous membrane. By careful observation we find two small lateral openings about an inch apart, into which we can sometimes pass a hog's bristle; these are the openings of the Fallopian tubes. The upper part of this pyriform tumor is set into the cervical ring. When the cervix shares in the process of inversion, it does so in an irregular manner—the anterior cul-de-sac being of a greater depth than the posterior. Upon the uterine mucous membrane can be seen, both macroscopically and microscopically, the lesions of glandular endometritis.

Chronic inversion without prolapsus forms a tumor which in aspect and consistency is much like a fibrous polypus, the pedicle being represented by that part of the body which is compressed by the cervix. The cervix remains in its normal position, though in some rare cases of complete prolapsus the cervical ring disappears and the

uterine and vaginal mucous membranes are directly continuous. In a chronic inversion the mucosa of the uterus often takes on the external characteristics of the vaginal mucosa, its glands disappearing in great measure (Schröder).

Chronic inversion with prolapsus is rare; it may be accompanied by ulceration due to friction and irritation. The mucous membrane becomes skin-like in its nature by the formation of layers of pavement epithelium upon its surface.

Cases have been reported of a species of spontaneous cure in which the inverted uterus was eliminated by sloughing.

Symptoms.—I shall make no reference to the acute inversion at the time of delivery, as it is a condition which cannot escape the notice of a careful physician.[3] If this inversion is only partial, the accompanying hemorrhage may not be alarming in its nature.

Inversion in the puerperal state may occur suddenly and be accompanied by sharp pain with grave reflex phenomena, even to syncope. In a few cases pain has been absent;[4] hemorrhage may or may not be present. If the inversion has taken place slowly and by degrees, as is usually the case when polypi are the cause, the symptoms may in no wise differ from those of simple prolapsus: metrorrhagia, however, is the rule, and should call for careful attention. All the group of uterine symptoms have been noted: pain, leucorrhœa, reflex symptoms in the digestive tract and nervous system, and sometimes phenomena of compression of the rectum and bladder. The tumor formed by the uterus resembles a polpus, but bimanual palpation will convince us that the uterus is not behind the pubis but filling the vagina. The signs of inversion may be combined with those of prolapsus, but this is rare.[5]

Diagnosis.—There are two mistakes possible: A simple inversion may be taken for a tumor (polypus), or an inversion complicated by a tumor may not be recognized. Whenever a supposed polypus has a large pedicle, we must be on our guard against falling into these errors. Certain positive signs will enable us to avoid them; the absence of the rounded mass of the uterus behind the pubis, demonstrated by rectal touch, hypogastric palpation, and a catheter in the bladder; a circular, pad-like constriction all around the tumor behind which the sound cannot be inserted; the recognition of the openings of the Fallopian tubes—all these are the signs of a simple inversion.

Inversion accompanying a polypus is more difficult of recognition, and it is often hard to determine to which cause the symptoms

are due. As a diagnostic sign, some authorities have mentioned the sensitiveness of the uterine mucous membrane in contradistinction to the lack of sensitiveness of the surface of a fibroid (Tillaux, Guéniot, Gosselin). The value of this sign has been disputed,[6] and it is evidently not pathognomonic.

The greater flexibility and deeper color of the uterine tissues indicate very little, nor does the consistence of the tissue as shown by thrusting in a pin reveal much more. If a thorough examination during anæsthesia does not decide the matter, I think it would be advisable to tie an elastic ligature about the pedicle, and incise the surface of the tumor in one place after another to a sufficient depth to ascertain whether or not a fibroid be present; if a capsule be found, the tumor may be enucleated with blunt instruments, after which iodoform tampons may be inserted and the inversion reduced. If the incision give a negative result, it can be carefully closed, by a suture in layers, before removing the hæmostatic ligature. Such an exploration would not be dangerous, and would prevent the disagreeable surprises which some surgeons have experienced who have undertaken complete extirpation of the tumor without preliminary precautions.

Simple prolapsus of the uterus cannot long interfere with a diagnosis. The disappearance of the vaginal culs-de-sac, the presence of the os uteri through which the sound can be inserted usually to more than the normal depth, will permit of its ready recognition. Obliteration of the os and the coexistence of a fibroid tumor might cause difficulty and is a complication for which one should be prepared.

Prognosis.—Once acquired, inversion tends to increase. Moreover, the patients are exhausted by hemorrhages, leucorrhœa, and pain. It is useless to build any hopes upon the few cases reported of a spontaneous reduction[7] of the displacement, or of those still more exceptional cases of gangrene, which, while effecting a cure, is by no means free from danger. We must, however, not ignore the fact that a remarkable tolerance may be acquired for even the most serious lesions.

Treatment.—Reduction is most easily accomplished immediately after the occurrence of the inversion. As soon as possible after delivery, having assured himself that no fragments of the placenta are left behind, the physician will introduce one hand into the uterine cavity and push the depressed fundus into place, which the other hand, strongly pressing upon the abdomen, will seize and hold.[8]

In a chronic case, the reduction is accomplished with far more difficulty, and yet some apparently permanent inversions have been cured. Audigé[9] reports a successful reduction in a case of thirty years' standing.

The methods of reduction employed may be divided into forcible and gradual reposition.

Forcible Reposition.—I shall merely enumerate these methods, without dwelling upon them, for I believe that they will fall into disuse;[10] the great majority of inversions can be reduced by the gradual method, and the exceptional cases which will not yield to this treatment are better treated by extirpation of the organ than by forced taxis.

For manual reduction the patient is anæsthetized; three fingers are introduced into the vagina and seize the tumor; the other hand grasps the uterus through the abdominal walls and serves to direct the pressure. Two methods have been suggested. One the reduction in mass, by grasping the whole of the inverted uterus; the other a gradual reduction, replacing first one horn of the uterus and then the other (Nöggerath). Emmet[11] recommends dilatation of the cervix with the fingers of one hand, while the palm of the other presses upon the fundus. Courty[12] draws down the uterus with Museux's forceps, fixes the cervix in place by two fingers hooked into the rectum, and with the thumb and index of the other hand presses upon the pedicle so as to gradually diminish the utero-cervical groove. Courty sometimes lessens the constriction by two or three longitudinal incisions which start from the os and extend upon the cervix, dividing its circular fibres. Barnes also uses this method. Emmet advises, when the fundus has been replaced within the cervix but not completely reduced, the suture of the os for a few days to prevent a possible return of the inversion.

Instrumental taxis by means of Viardel's drumstick repositor or White's instrument, which has a sort of cup to hold the tumor and an elastic spring at the other end which is held against the chest of the operator, possesses for us only an historic interest.

Gaillard Thomas,[13] on account of the difficulties encountered in operating through the vagina, because of the cervical constriction, performed a laparatomy, dilated the cervical ring with an instrument shaped like a glove-stretcher, and with great difficulty pushed the uterus upward through the vagina. The vagina was perforated, and the patient had a severe hemorrhage but recovered; a second one died.

In view of these risks, I cannot agree with a recent writer[14] who considers this operation as one to be highly recommended, for even in patients young enough to have children hysterectomy seems to me safer.

Gradual Reduction.—Rest in bed, hot vaginal injections, and massage should all be used to diminish congestion and reduce the size of the uterus. With these aids continuous pressure upon the tumor is the chief curative method and, if persisted in, it is almost sure to succeed. Hofmeier[15] has never seen it fail. There are many ways of applying it. Tyler Smith,[16] who was soon followed by Teale, West, Bokenthal, Courty, etc., was the first to reduce an inversion of twelve years' duration, by the continuous pressure exerted by an air pessary (Gariel's). One of these can be introduced empty, and then distended as much as possible. Its action seems to be exerted in many ways: by direct pressure upon the tumor it diminishes its volume; its prolonged contact with the cervix serves to loosen it; and finally the presence of the pessary may excite uterine contractions which work from below upward and help in the reduction. In other countries, a colpeurynter, a rubber bag filled with water, is often used. It may take a month or more to accomplish the reposition, which is usually preceded by sharp pain. Thomas, Barnes, Duncan, Aveling, etc., speak in praise of a cup and stem pessary which is fastened to a belt by elastic bands. I consider it a dangerous instrument and one likely to cause sloughing.

Tamponade with iodoform gauze is far preferable to these methods, as it is simple, easy of application, and requires no especial instruments. It is to be renewed every two or three days, and to be done with the utmost care, using long strips of gauze about two fingers' breadth wide, which is packed around and above the tumor, being pressed in place with some force. The patient is to be kept in a horizontal position, the bowels to be kept open by enemata, and, should micturition be difficult, the catheter is to be regularly passed.

Removal.—A few cases will resist even a long-continued pressure treatment. The removal of the inverted portion of the uterus is then justifiable, for the accidents caused by inversion often threaten life itself. The history of the methods used for excision of the inverted uterus before the days of antisepsis is as long as it is wearisome, and contains the oldest records of hysterectomy.[17] Amputation by means of a straight écraseur[18] is not to be tolerated. It is a very slow procedure, gives rise to agonizing pain, does not prevent hemorrhage, and may wound neighboring organs. Incision immediately preceded by

the application of a ligature[19] or a clamp;[20] section by the galvano-cautery; slow ligature with iron wire or rubber tubes frequently tightened, preceded by the formation of a groove with the thermo-cautery (Courty), are ancient methods which should be obsolete, although, used properly, they are capable of giving good results.[21]

Perier[22] has greatly facilitated the application of the slow ligature by invention of his process of elastic ligation with traction, in which he uses a toothed ligature tightener. Those practitioners who are not familiar with the operation of vaginal hysterectomy could utilize this method with profit. Instead of applying the rubber cord directly to the portion to be excised, Perier ties a silk thread around the inverted uterus and exerts traction upon this thread by means of a rubber ring. The constricting band is then constantly tightened, by

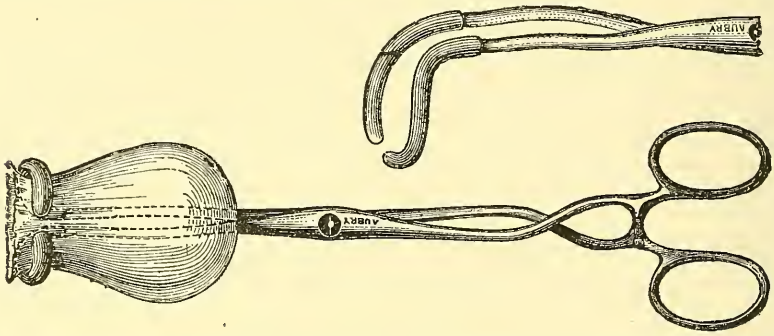

Fig. 295.—Forceps with Semi-Annular Jaws Guarded by Rubber for Grasping the Inverted Uterus (Perier).

being drawn more and more through an opening at the end of the metallic holder which serves to maintain the traction. This holder has a toothed arrangement at one end, each tooth acting in its turn as a hook to hold the rubber ring as it becomes necessary to pull it more tightly. The instruments necessary to the operation are: Forceps to grasp and pull down the uterus (Fig. 295), a toothed ligature holder (Fig. 296), strong silk thread, a rubber ring, and a hook (an ordinary button-hook will answer the purpose).

The uterus is first drawn down, the inversion being rendered complete if previously incomplete, then a loop of strong silk is passed around just above the jaws of the forceps, and tied as tightly as possible, its two ends being passed through the eye of the ligature holder, which is carried up to the point where the silk encircles the uterus. A rubber ring is now fastened to the constricting band by a second knot, which it is important to tie securely, since upon it will come all

the strain when the rubber ring is pulled upon. With the hook the free side of the rubber ring is seized, drawn down, and slipped over one of the notches of the handle. The uterus is allowed to return to its former position in the vagina, and the handle of the ligature holder emerges from the vulva without exercising any pressure upon the soft parts, being held in the axis of the vagina. Upon the days following the operation, the rubber ring may be drawn over notches farther and farther removed from the uterus, thus progressively tightening the ligature. Between the ninth and the fourteenth day, the uterus becomes detached, a shrivelled and unrecognizable mass. Antiseptic vaginal injections should be used twice daily.

Kaltenbach[23] advises the immediate amputation of the inverted portion of the uterus, after the application of a temporary elastic liga-

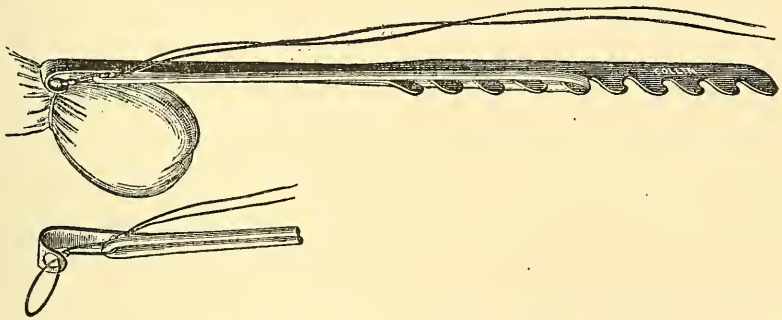

Fig. 296.—Ligature Holder Used in Removal of the Inverted Uterus by Perier's Method.

ture. As a precautionary measure, and to prevent any possible slipping of this ligature, the peritoneal surfaces may then be joined by deep sutures passing obliquely under the surface of the stump in such a way as at the same time to compress the blood-vessels. The stump may be dressed with iodoform or sublimate gauze, and will fall about the third week, by which time the two peritoneal surfaces are quite united, which will prevent the formation of any vagino-peritoneal fistula, which might lead to an extra-uterine pregnancy. If the pedicle is very large, a double elastic ligature can be applied by transfixion.

The technical details of total extirpation of the uterus through the vagina have been so accurately tested, and the operation has given such excellent results (page 360), that, for my part, if reduction were not possible, I should not hesitate to perform it rather than an amputation limited to the inverted portion.

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3. W. W. Jaggard (Gynec. Soc. of Chicago, November 19th, 1886, reviewed in Centr. f. Gyn., 1887, p. 402) reports a case where an inversion dating from confinement was overlooked, and the symptoms attributed to the puerperal state, the physicians having actually refrained from examining the patient from the fear of infecting her.

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7. Spiegelberg: Arch. f. Gyn., Bd. iv., p. 350 and Bd. v., p. 118.

8. R. Teuffel (Centr. f. Gyn., No. 25, 1888) reports a great success by means of this manœuvre which he rates very highly.

9. Audigé: Paris Thesis, 1881.

10. These manœuvres are always attended by some degree of danger; the vagina has often been torn by the efforts of taxis. T. P. Teale: Chronic Inversion of the Uterus reduced by Taxis; Laceration of Vagina into Douglas' Pouch; Recovery. Lancet, 1887, vol. i., p. 11.

11. Emmet: Principles and Practice of Gyn., 1880, pp. 410–437.

12. Courty: Traité Pratique des Mal. de l'Uterus, 3d ed., 1881, p. 730. Chauvel: Bull. Soc. de Chir., 1879, p. 352.

13. Thomas: Dis. of Women, 1872, p. 434.

14. Bouilly: Encyclop. Internat. de Chirurg., French ed., vol. vii., p. 689. Mundé (Laparatomy for Reduction of an Inverted Uterus, in American Journal of Obstetrics, 1888, vol. xxi., p. 1,279), after having tried in vain to reduce a case of chronic inversion, decided to perform a laparatomy and dilate the cervix from above, according to Thomas' method. Not succeeding in this, he performed ovariotomy and removal of the uterus with an elastic ligature. A cure followed.

15. Hofmeier: Grund. der gyn. Oper., p. 239, 1888.

16. Tyler Smith: Med. Times and Gazette, April 24th, 1858.

17. Two curious cases are found in Rosset's celebrated work, Cæsarei Partus Assertio Historiologica, Paris, 1590, p. 332. After ligating the uterus, he excised the inverted portion and then cauterized the stump with a red-hot iron. One of the cases occurred in 1533. Both patients recovered. I have brought together many of these historical facts in a thesis entitled, Sur la Valeur de l'Hystérotomie, 1875, p. 149. See also Denucé: Traité de l'Inversion Utérine, Paris, 1883.

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19. Palasciano, quoted by Courty: Loc. cit. (12), p. 736.

20. Valette (of Lyons): Lyon Médical, 1871.

21. Le Fort: Inversion Utérine; Ligature Élastique; Guérison. Bulletin Soc. de Chirurgie, 1887, p. 201. A piece of rubber cord was wound seven or eight times around the pedicle, and below this ligature was placed another of ordinary thread. No excision of the tumor; at the end of thirteen days the ligature came away. A cure resulted.

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CHAPTER XXI.

MALFORMATIONS OF THE CERVIX—ATRESIA. STENOSIS. ATROPHY. HYPERTROPHY.

Atresia.

By atresia of the cervix we mean that the os uteri is imperforate or occluded.

Congenital atresia[1] is in the great majority of cases found only as accompanying other and graver malformations, as double uterus and vagina, whose description belongs to the general history of malformations of the genital organs. Theoretically we should here include a description of those rare but incontestably existing cases where the only congenital lesion has seemed to be an imperforate cervix, the occlusion being either at the internal or the external os,[2] but as the clinical results of this anomaly are identical with those of absence of development of the upper portion of the vagina, its description would involve needless repetition.

Acquired atresia[3] follows sloughing after labor, cicatrices resulting from excessive cauterization of the whole periphery of the cervix, amputations which have not resulted in lining the circumference of the cervical opening with mucous membrane but have permitted a concentric retraction of the inodular tissue. It may also follow the cicatrization of ulcers of the cervix coincident with senile atrophy of the uterus; finally it may, in old women, be due to a tumor in the cervix or lower portion of the body of the uterus. Atresia also occurs, in prolapsus uteri, as a result of the friction of a pessary or of the thighs upon the os if there be complete prolapse. It may occur spontaneously in old age; and some cases, to my mind of doubtful occurrence, have been reported of atresia appearing during pregnancy.[4]

The results of this obliteration vary as the patient has or has not reached the menopause. If not, we must be on our guard against hæmatometra and hæmato-salpinx (see chapter on Malformations). If she have ceased menstruating, the lesion usually causes no disturbance unless some cause of septic infection exist in the uterine cavity

causing an accumulation of pus (pyometra) or gas (physometra). I have seen two cases of pyometra from cancer of the body of the uterus and fibroma in aged women. The treatment in such a case consists in incising or puncturing the cervix if it be necessary to disinfect the uterine cavity, and then in meeting the indications called for by an existing fibroma or cancer.

Stenosis.

Stenosis is a narrowing of the cervical canal, which may be congenital or acquired. When congenital, it is usually accompanied by a

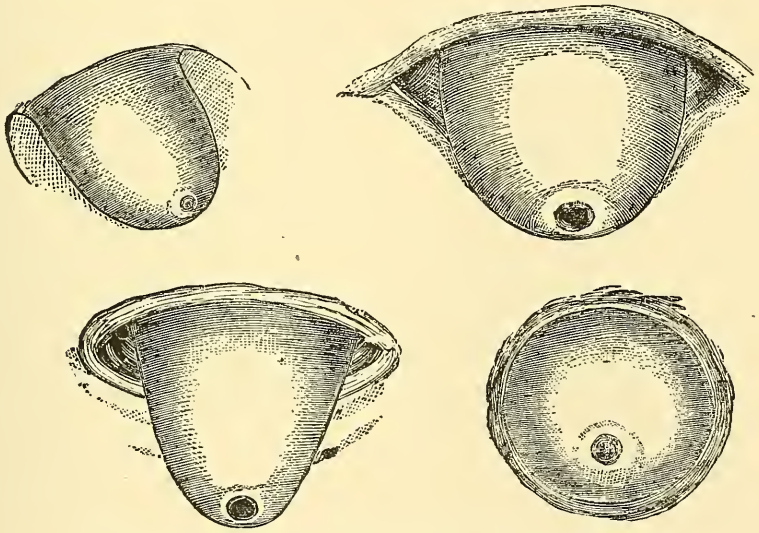

Fig. 297.—Cervical Stenosis—Various Forms of Conical Cervix.

conical cervix, often hypertrophied in inverse proportion to the development of the body of the uterus. The conical or sugar-loaf cervix is firm in consistency and has at its apex a pin-hole os (Fig. 299). The anterior lip may protrude a little, giving the appearance of hypospadias of the canal, or it may resemble the trumpet-shaped snout of a tapir, in which case the stenosis is usually accompanied by congenital hypertrophy of the cervix (Fig. 297). Congenital stenosis may be the result of an anteflexion of the uterus, pronounced enough to obliterate the cervical canal. Acquired stenosis is due to the same causes as atresia. One of the consequences of the narrowing is the retention of the cervical mucus, which accumulates, and dilates the cavity of the cervix. Catarrhal inflammation of the mucous mem-

brane follows, causing an increased secretion of discolored, tenacious, viscid mucus (Fig. 298). The use of speculum and uterine sound will speedily decide the question of the existence of this condition; when the sound has passed the os, it enters an ampulla-like dilatation of the cervical cavity.

Dysmenorrhœa and sterility are the two more prominent symptoms, though in some cases dysmenorrhœa is absent.

The pain experienced during menstruation, the obstructive dysmenorrhœa of English writers, is usually situated in the lumbo-iliac and sacral regions; it is colicky in its nature, coming on spasmodically, when the amount of blood exuded is too great to be immediately car-

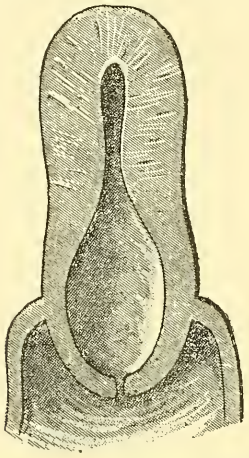

Fig. 298.—Cervical Stenosis. Dilatation of the cavity of the cervix by retention of mucus, in a case of cervical endometritis with narrowing of the external os.

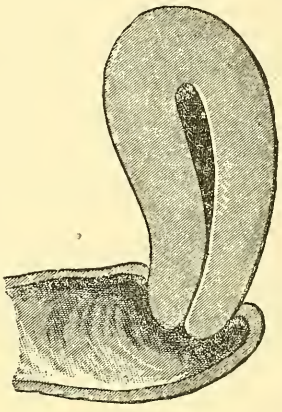

Fig. 299.—Cervical Stenosis. Uterus with narrow cervical canal, without flexion. (Typical case for Simpson's operation.)

ried through the narrowed canal, or when the cervix is obstructed by a clot. Relief follows a breaking of the clot. The pain is frequently so intense that the patients develop marked nervous reflexes, as syncope or uncontrollable vomiting, which leave them in a condition of extreme prostration. These patients are usually chlorotic, anæmic, dyspeptic, and neuropathic. Endometritis frequently results from the imperfect evacuation of the mucus and blood from the uterine cavity and the group of uterine symptoms then persists in the intervals between the menstrual periods. This is a frequent form of the endometritis of virgins.

Stenosis oftentimes causes sterility, although its influence in this particular has been exaggerated since the days of Sims. The mechan-

ical obstruction to the entrance of the spermatic fluid is a less important factor than the mucous congestion of the cervical canal. Normally, during coition, the cervix, by a species of erethism which Rouget has compared to true erection, expels the mucus which it contains.[5] From aspiration succeeding the cessation of the venereal orgasm, or simply from capillarity, the alkaline vaginal mucus mixed with spermatic fluid enters the cervix in its place.[6] This exchange is prevented by the narrowness of the external aperture, which is completely stopped up by a plug of acid mucus.

Diagnosis.—The most interesting and delicate point of diagnosis consists in localizing the exact point of maximum of constriction. Where there is a conical cervix with a pin-hole os hidden by a drop of viscid mucus not unlike the small concrete masses of sputum from the larynx, the external os is without doubt one of the points at fault. But it may not be the only one; for as Bennett justly remarks, there is normally another narrow opening at the upper end of the cervix which may be constricted (Fig. 299).

Stenosis of the internal os has been said to be due to contracture, but I consider this doubtful. It seems to me to be the result of incomplete development, with or without congenital anteflexion. Acquired stenosis from excessive cauterization is more rare at the internal than the external os, and worthy of passing mention only.

If difficulty is experienced in passing the sound through the internal os, we must not jump to the conclusion that there is necessarily a constriction at this point. We must first be certain that the tip of the sound has not come against a fold of mucous membrane or the angle of a flexion; and to ascertain if this be so, we bend the sound in accordance with the presumed direction of the cervico-uterine canal, press down the handle toward the fourchette, and draw down the posterior lip of the cervix in the case of an anteflexion, and the anterior lip in case of a retroflexion. We must grope gently with the sound a great many times before the diagnosis can be established with certainty.

Prognosis.—Congenital cervical stenosis, which is the most frequent form, disappears after fecundation and labor, not so much from the excessive dilatation as from the structural changes undergone by the uterus in pregnancy. The efforts of the surgeon should be directed toward favoring fecundation, and the various methods of artificial dilatation are to be regarded as merely temporary and palliative.

Treatment.—Slow dilatation with laminaria tents, or rapid pro-

gressive dilatation with graduated bougies, gives merely ephemeral results, yet it may be used to advantage before each menstrual period. I prefer Hegar's dilating bougies, and believe that their frequent use may stimulate the vitality of a more or less incompletely developed uterus (for details, see page 112 *et seq.*).

This operation, although a minor one, must be considered worthy

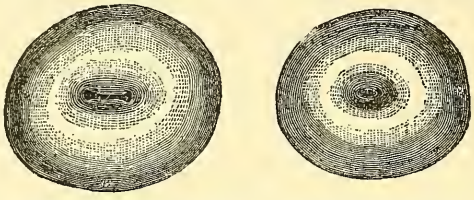

FIG. 300.—CERVICAL STENOSIS. Normal and pin-hole os.

of antiseptic precautions. Some serious accidents have been known to follow it, and doubtless a greater number still have not been reported.[7]

Division of the *external* os may be done with a bistoury, with strong scissors, with Küchenmeister's scissors (which have hooked

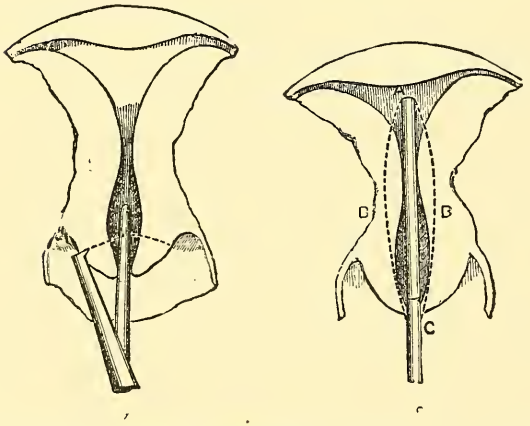

FIG. 301.—DISCISSION OF THE CERVICAL CANAL. 1, Division by Küchenmeister's scissors; 2, Division with a double hysterotome. The dotted line *A*, *B*, *C*, indicates the segment incised by the separation of the blades.

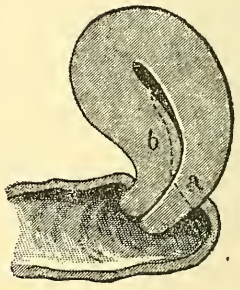

FIG. 302.—STENOSIS OF THE CERVICAL CANAL. Line of incision at the internal os; *a*, incision of the external os on a level with the posterior lip; *b*, incision of the internal os on a level with the anterior wall.

ends to prevent slipping), or with some one of the many forms of hysterotome which have been invented since Simpson[8] first recommended this operation. Marion Sims[9] made great use of this method of treatment, and brought it into a prominence which is at this day hard to understand from an exclusively scientific point of view.

Since his time gynæcology has passed through a period when discission of the cervix was carried to an extreme. Any young wife in whom pregnancy was a trifle delayed, any young girl or woman suffering during menstruation, was considered a fit subject for this operation. Now, however unimportant it may seem to be, it has most certainly led to fatal results, especially before the days of antisepsis.

We must distinguish between section of the external os (which may be median, posterior, bilateral, or crucial) and an incision which is carried into the cervical canal and to the *internal* os (Fig. 302). The incisions may be made with a probe-pointed bistoury, after drawing the cervix down and steadying it. This operation is far more serious than the one first mentioned. To arrest hemorrhage, the wound may be loosely tamponed with small pledgets of cotton soaked in perchloride of iron, which are to be taken out on the following day. The patient should be kept three days in bed. Barnes' small elastic-stem pessary or Thomas' glass stem may be worn for several days in the cervix.[10]

I do not describe these operations in detail, because I consider them bad practice. Incisions of the external os either by cicatrization cause stenosis again, or by gaping cause an eversion of the mucous membrane and consequent cervical catarrh. The deeper incisions are not unattended by danger, for, however carefully one may use the hysterotome, the instrument with which we are working in the dark may easily slip and cause serious accidents. I much prefer the probe-pointed bistoury, which is more manageable.

Dilatation of the cervix by either the bloodless or bloody operations may give excellent results in those cases where the stenosis is slight and accompanied by quite disproportionate nervous reflex phenomena. However, two opposite theories have been advanced in regard to this subject. Schauta, who advocates incision, claims to have cured hysterical neuroses by the section of nerve filaments; he states that in such cases dilatation by the bloodless method is of no avail.[11] On the other hand, Doléris recommends forced dilatation of the cervix under the same circumstances, claiming that it acts in the same way as nerve-stretching.[12] It seems to me that the relief afforded by both of these methods may be fully explained by the ready flow of previously retained mucus, which removes a source of continual reflex action. Gastric troubles as well as pain are rapidly relieved.[13]

Electrolysis[14] has been highly praised. The advantages claimed for it are, its harmlessness and painlessness and its efficacy due to

the fact that the slough produced by the negative pole leaves a cicatrix as soft and distensible as that produced by alkaline caustics. Currents of feeble strength but long duration are recommended.

In cases of slight stenosis I prefer the simpler method of gradual dilatation with Hegar's bougies (after softening the cervix with laminaria). I sometimes combine this treatment with very small incisions upon the circumference of the os with a probe-pointed tenotome to facilitate the insertion of the laminaria.

In cases of marked stenosis, the only rational operation seems to me to be a plastic operation for the production of an external orifice of sufficient size. The operation of stomatoplasty does not affect the external os only, as one might imagine. By the functional changes which it induces in the cervix, the upper portion of the canal becomes more permeable. There are cases where a flexion of the uterus gives the impression of a constriction situated high in the cervix. This flexion often disappears after the operation, so that I consider it advisable to wait a while before attempting to treat a suspected stenosis of the upper portion of the canal which has been diagnosed by anterior palpation. Later, should the stenosis persist, gradual dilatation with Hegar's bougies is preferable to incision, though a few slight scarifications may be made to facilitate the passage of the first bougies, but these do not in the least resemble the deep discission of Simpson, Sims, etc.

Stomatoplasty is in reality nothing more nor less than amputation of the cervix. I have minutely described it in the chapter upon the Treatment of Metritis (p. 207). According to the case, one may choose one or the other process described. If the cervix is thick and fleshy, the biconical excision (of Simon-Marckwald) is to be preferred. If the mucous membrane has undergone profound alteration, the single flap operation of Schröder is the better. I have sometimes combined the two methods where the cervix was conical, taking a wedge-shaped piece from the anterior lip, but paring only one surface on the posterior lip. Whatever method be adopted, the result aimed at is the formation of a transverse opening of ample size, with the mucous membrane lining it to the very edge in such a way that it will not contract after the operation.

Congenital Atrophy of the Cervix and Uterus.

There is a so-called congenital atrophy to which it would be better to apply the term congenital predisposition to atrophy, for after birth

the uterus may experience a general retardation of growth which cannot properly be called an arrest of development like that which occurs in prenatal life—an arrest which would produce a malformation either by the excess or absence of some portion of the organ—this general retardation resulting in an adult uterus of infantile proportions but unaltered in its type. The whole organ is small and its walls thin, but the relative proportions of body and cervix are normal, thus differing from the fœtal uterus. This type Puech calls a uterus pubescens, to show that it preserves the proportions found at puberty. Virchow calls it hypoplasia of the uterus. As a usual thing, it is accompanied by atrophy of the other internal and external organs of generation. According to Puech,[15] the uterus pubescens weighs about 405 grains instead of 675.

This infantile condition of the genital organs is often accompanied in the female (as in the male) by a general lack of development, a young woman of twenty years and more having the appearance of a child who has not yet reached puberty. In other cases, the atrophy is limited to the sexual apparatus, and there are no external signs of it visible except a narrowness of the pelvis. There is, in fact, with rare exceptions, an intimate relation between this part of the bony framework and the internal genital organs. Atrophy is to be attributed to a congenital predisposition of unknown origin. It has been supposed to be due to chlorosis or tuberculosis, but it seems to me that cause and effect have been reversed, the women with this malformation possessing a defective nervous system and general in nutrition because of the genital lesion.

Symptoms and Diagnosis.—Complete or partial amenorrhœa is the first thing noticed by the patient. The menses may fail to appear and the patient be sexless from a physiological standpoint. If they do appear, they are usually accompanied by dysmenorrhœa and serious nervous symptoms. Some of the patients inherit a defective nervous system, and belong to the neurotic class called *dégénérés* by the alienists; they possess a feeble intellect, and have hysterical or epileptic seizures. This is not, however, a general rule, for another class of patients with a uterus pubescens have a vigorous constitution in every other respect. Local examination reveals a small cervix with a narrow os; bimanual palpation, rectal touch, the passage of the sound, all show atrophy of the uterus itself; the external genitals are usually incompletely developed; the vagina is shorter than usual. The normal proportion of the cervix in uterus pubescens distinguishes

it from the fœtal or infantile uterus* where the cervix is large and the body atrophied.

Treatment should be at first directed to the general condition. Tonics, nourishment, hydrotherapy, sea air, all tend to improve the health and favor development. As to local treatment, there is scarcely any of value. It has been suggested that pessaries with galvanic stems of iron and copper might induce feeble electric currents and act as local stimulants, but this method is not without difficulties and dangers, and a good result is by no means certain. It would be far more rational to apply electricity directly, using a continuous current. Symptomatic treatment should be directed to the dysmenorrhœa. If this be very severe and the nervous symptoms marked, it would be reasonable to suppose that the development of the ovaries was out of proportion to that of the uterus; if an examination under chloroform established this fact, ovariotomy might be indicated.[16]

Acquired Atrophy, or Superinvolution of the Cervix and Body of the Uterus.[17]

Pathological Anatomy and Etiology.—Normally, the termination of sexual functions in the female is marked by a shrinking in size of the uterus, which is progressive, so that in aged women the uterus is extremely small, unless, as frequently occurs, it contain a fibroid body.

Senile atrophy affects both body and cervix, the latter being often only a shapeless stump, or even disappearing entirely with the exception of the os, which is seen at the end of the vagina. This occurs most often in women who have borne many children. Atrophy sometimes begins before the menopause, after a labor which seems suddenly to exhaust the vitality of the uterus, the normal involution being carried beyond physiological limits. James Simpson[18] estimates the occurrence of this atrophy at about 1.5 per cent, and Frommel[19] at 1%. But these superinvolutions are sometimes only temporary in duration. Frommel considers prolonged lactation[20] as one of the principal causes of atrophy. Profuse hemorrhages during labor seem to exert a predisposing influence, as do all debilitating diseases—

* This second term must not be misunderstood. It is derived from *infans*, and means properly a fœtus at term. The name *puerile* or *childish* might be applied to the uterus pubescens, indicating that it is analogous to that of a child (before puberty).

tuberculosis, chlorosis, syphilis, diabetes,[21] Bright's disease, morphinism, Basedow's[22] disease, etc. Diseases of the genital organs, as prolonged endometritis and oöphoro-salpingitis often terminate by atrophy.

Pelvic peritonitis during the puerperal period, or rather the septic peri-oöphoro-salpingitis which sometimes follows labor or abortion, may, by causing sclerosis of the ovary, bring on a premature menopause and superinvolution. Finally, I have noted that the diminution in volume of the body of the uterus, which Braun[23] observed to follow amputation of the cervix, may go on to atrophy of the uterus. In an old woman upon whom four years ago I performed a conoidal amputation of the cervix, according to Huguier's method, for prolapsus, the uterus has become reduced to the size of a walnut. In the case of a young woman where I excised a portion of the cervical mucous membrane for severe endometritis, the uterus was for a time greatly diminished in size, but finally returned to its normal condition.

[Hardon[24] has noted nine cases and Hawkins two where superinvolution occurred after the closure of a lacerated cervix by Emmet's operation. In eight of these eleven cases which were treated by intra-uterine faradization the menses returned, while in three which received no treatment the condition persisted.]

Removal of the ovaries is a cause of uterine atrophy, and some authorities[25] have not hesitated to perform an ovariotomy for the cure of persistent, painful endometritis.

In senile atrophy, the uterine tissue is sclerotic; in post-puerperal superinvolution it may be soft and friable from incomplete absorption of the fatty substances produced by the disintegration of the muscular fibres.[26]

Symptoms and Diagnosis.—The cessation of the menses and the diminution in volume of the cervix and body of the uterus, as proved by the various methods of exploration, establish the diagnosis. The greatest caution should be exercised in the use of the sound in post-puerperal atrophy, as the walls may be thinned. In cases of senile atrophy, the sound can penetrate only to the depth of about two to two and a quarter inches, while in puerperal superinvolution the cavity is usually normal, but may seem to be deepened from the yielding nature of the uterine tissues.

Prognosis and Treatment.—This post-puerperal superinvolution may be only temporary in its nature; and the observation of many cases has gone to prove that fecundation and pregnancy may after-

ward take place. A return of the functional activity of the uterus should be aided by general tonics, hydrotherapy, salt baths, the intra-uterine application of electricity, and local stimulation produced by hot injections and the often-repeated passing of the sound into the uterine cavity. I prefer these methods to the use of a galvanic or elastic stem pessary, which seem to me to play the harmful part of a foreign body rather than to benefit.

Hypertrophy of the Supra-vaginal Portion of the Cervix.

Hypertrophy may affect the supra- or the intra-vaginal portion of the cervix. I have already described the first lesion under the head

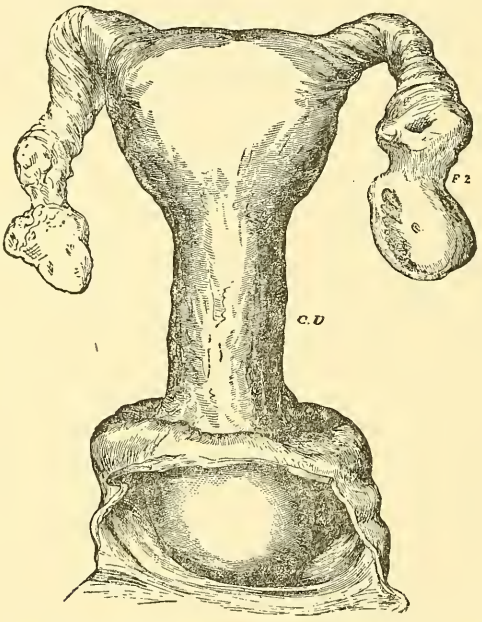

FIG. 303.—HYPERTROPHY OF THE SUPRA-VAGINAL PORTION OF THE CERVIX.

of Prolapse of the Genital Organs, which it so frequently accompanies. Polaillon[27] records a case where both the supra-vaginal portion of the cervix and the body of the uterus had undergone a gigantic hypertrophy; the uterus, which was not altered in shape and in which there was no tumor, filled the whole abdomen. The patient was thirty years old; etiology unknown; symptoms of endometritis present. Polaillon advised injections of ergotin into the substance of the uterus, the continuous electric current, and, as a last resort, ovariotomy. These exceptional cases of a gigantic uterus could not be mistaken

for hypertrophy of the supra-vaginal portion of the cervix. The hypertrophy following upon the presence of fibrous body or "grossesse fibreuse" could also be easily recognized by the special symptoms caused. The only symptom common to all of these conditions is the unwonted depth to which the sound may be carried.

Hypertrophy of the Intra-vaginal Portion of the Cervix.

Etiology and Pathological Anatomy.—I shall not dwell upon acquired hypertrophy, following endometritis, having already fully de-

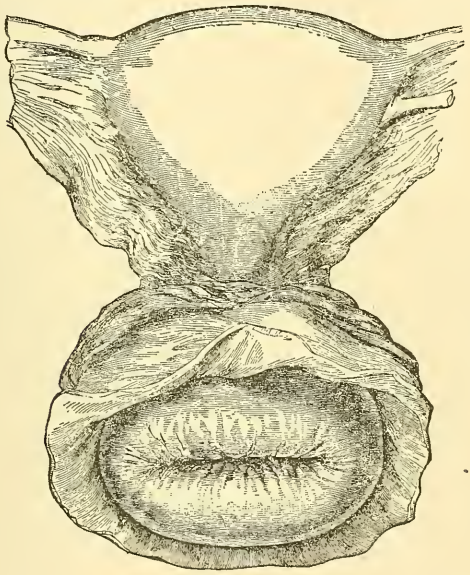

FIG. 304.—HYPERTROPHY OF THE INTRA-VAGINAL WITH ELONGATION OF THE SUPRA-VAGINAL PORTION OF THE CERVIX.

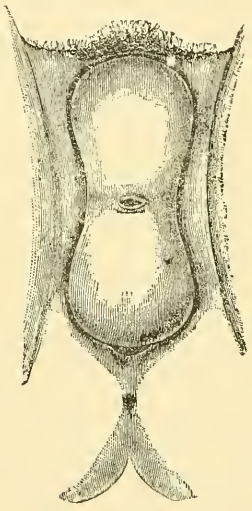

FIG. 305.—HYPERTROPHY OF THE INTRA-VAGINAL CERVIX WITH A DEEP BILATERAL LACERATION.

scribed it (p. 147). I would simply recall the fact that there are two varieties: Follicular hypertrophy, which especially affects the mucous membrane, which is filled with newly formed glands that have undergone cystic degeneration; and sclero-cystic hypertrophy, where the substance of the cervix is distended by the production of connective tissue and small cysts or glands of Naboth.

The first of these varieties is fungoid and soft to the touch; the second nodulated (tubereuse) and firm. They both often give the cervix the appearance of a club or of a bell-clapper (Figs. 304 and 305.) Very different in form and structure are the congenital and develop-

mental hypertrophies which appear at puberty and subsequently progress more or less. In this case the change of size is not due to inflammation. The whole structure of the uterus seems to undergo hyperplasia simultaneously, without deviation from the normal type; the mucous membrane is in a healthy condition. The cervix is elongated, conoid or cylindrical in shape, sometimes like a tapir's snout because of the prominence of the anterior lip.[28] It may fill the vagina and project from the vulva, leading the patient to suppose that there is uterine prolapse. Stenosis of the external os frequently accompanies this affection, as I have already stated (Fig. 297).

Symptoms and Diagnosis.—Dysmenorrhœa often precedes the appearance of the cervix at the vulva; in young girls this is what usually first calls attention to the affection. Married women suffer from dyspareunia. If the hypertrophy is not very marked, the male organ pushes it to the front, and forms a species of false vaginal passage by depressing the posterior cul-de-sac, which is found to be of increased depth. Pain, leucorrhœa, and metrorrhagia complete the group of uterine symptoms. The vaginal touch and use of the speculum will reveal the nature of the tumor; the location of the fundus in its normal position will prevent a diagnosis of prolapsus or inversion; the connection of the cervix with the body of the uterus, and the perception of the external orifice, will exclude a polypus. Careful bimanual palpation, and the use of the sound, will show whether there be also any hypertrophy of the supra-vaginal portion of the cervix.

Prognosis and Treatment.—There is no tendency to retrogression. Operative procedures alone will remove this source of continual pain and discomfort.

Biconical amputation of the cervix is the best of all operations (p. 207). If hemorrhage be feared, or if the operator be not sufficiently experienced to perform the operation rapidly, temporary hæmostasis may be secured by tying an elastic cord above a strong needle which is thrust through the cervix just below the vaginal attachment and which will prevent the cord from slipping. This manœuvre is rendered very easy of accomplishment by the use of my elastic-ligature carrier.

After amputation of the intra-vaginal portion of the cervix, the supra-vaginal portion, if hypertrophied, may undergo a retrogressive process and become normal in size.

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CHAPTER XXII.

DISORDERS OF MENSTRUATION.

Precocious and Protracted Menstruation.

In our temperate climate, menstruation usually begins in the fifteenth year, and ends in the forty-seventh, giving a menstrual life of about thirty-two years. Those who menstruate early usually continue to do so longer than usual.[1]

Puberty occasionally occurs at a very early age. The pubes become covered with hair, the breasts and external genitals undergo rapid development, and the menses finally appear and either continue with great regularity or cease in a few years.[2] Campbell[3] has recorded an excessive development of the generative organs in a child of four years, who had regularly menstruated every three weeks since birth, Prochownick[4] had the opportunity of performing an autopsy upon a little girl of three years who had begun to menstruate at one year, and found upon the ovaries all the signs of both old and recent ovulation. Young girls have become pregnant at the incredibly early age of eight,[5] ten,[6] eleven,[7] and twelve[8] years. These cases of precocious puberty in the female have their analogues in the male.[9]

A report of protracted menstruation is to be received with some reservation. Women not far from the menopause are apt to consider any intermittent or irregular hemorrhage as a continuation of the menses, especially if the interval between them and the last period has not been long.

The flow, however, may be caused by some uterine affection whose existence had not been suspected, as[10] endometritis, mucous polypi, fibromata, and especially cancer. It is true, however, that some indisputably authentic cases have been reported of menstruation lasting until the fifty-sixth or fifty-seventh year.[11]

Amenorrhœa.

By amenorrhœa we mean the absence of menstruation, and not simply the lack of a periodical discharge through the genital tract. Menstruation may in fact exist, but in a latent form, as in the case of

retention of the menstrual flow from atresia, etc. We must carefully distinguish between these two classes of cases. In the second, the amenorrhœa which might appropriately be called obstructive,[12] is merely a secondary symptom; it is considered in the chapter upon Malformations of the Genital Organs.

Primary or permanent amenorrhœa is the term used where menstruation has never occurred; it has also been called emansio mensium. The amenorrhœa which is called transitory or secondary, or accidental, has been called suppressio mensium.

Pathology—Etiology.—The female organism between puberty and the menopause may be said to simultaneously live two lives—that of the individual, and that of the species; that of the organs in general, and that of the generative apparatus in particular. This dual existence, whose physiological and psychological effects are so important, may be interrupted by the influence of sickness, as it is by that of age. Amenorrhœa is simply the absence or suspension of sexual life, produced either by organic impotence or by a profound disturbance of the general nutrition of the individual. We must look at the matter from this point of view in order to fully understand the unexpected and excessive disorders caused by the disturbance of this equilibrium. The sexual apparatus is not, so to speak, an accessory wheel in the female mechanism: it is, on the contrary, the chief wheel, and it is to secure its proper action that constant economies and reserves are made by nature. The whole economy of nutritive receipts and expenditures bears directly upon the fact that a woman is, according to nature's plan, liable at any time to conception. The Hindoos, not without some show of reason, consider all menstruation which has not been preceded by intercourse to be infanticide; hence young girls are married just before puberty, to prevent their committing the crime even once. We might say, with paradoxical conciseness, that a woman's normal condition is pregnancy or lactation. During these periods menstruation ceases; it returns only when the excess of nutritive material is no longer required for these purposes. Menstruation may then be considered a safety-valve; its absence indicates a lowering of nutrition, when it is not the normal result of the utilization of the nutritive materials for the reproduction of the species.

There are no well-authenticated[13] exceptions to the general rule that menstruation is suspended during pregnancy; there are many exceptions, however, for the period of lactation, but the milk is usually more or less altered in quality during the menstrual flow.[14]

The conditions necessary to a normal and regular menstruation may be enumerated as follows:

a. Integrity of the genital apparatus.

b. Normal condition of the blood.

c. Normal state of the nervous system.

Any disturbing influence originating in one of these systems may prevent the maturing of the ovum, or disturb ovulation, or, by an inhibitory influence upon the sympathetic or vaso-motor nerves, interfere with the intense congestion which is the necessary precursor of the menstrual flow. Anything impairing the integrity of the ovaries—cysts, sclerosis, periovaritis—acts directly upon the starting-point of the reflex action, and at a sufficiently advanced state may abolish it entirely. It is, however, more usual for these injurious agents, which have not completely destroyed the organ, to play the opposite part of excitants, and produce menorrhagia with dysmenorrhœa, instead of amenorrhœa.

Does removal of both ovaries absolutely cause a cessation of menstruation? This question, the answer to which at one time seemed positive, has of late been asked by surgeons after a vast number of experiments whose results were contradictory. In considering the matter one great distinction must be observed. The same importance should not be given to cases where cystic or papillary tumors have been removed, as to those where ovariotomy is performed for slight changes, as sclero-cystic degeneration, which have modified but little the size and connections of the organ, or even where it is performed upon perfectly healthy ovaries (Battey's operation). Cases of the first class should be carefully inquired into, for in the case of a large tumor it is often impossible to affirm positively that a small fragment of ovarian tissue has not been left in the pedicle, and that would in itself be quite sufficient to allow of the continuation of menstruation. There remain a large number of well-authenticated cases belonging to the second class, where, in spite of a double ovariotomy, menstruation continues with more or less regularity.[15] But if the cases are attentively followed for any length of time, it will be found that this *posthumous* menstruation, so to speak, invariably ceases after a few months. It is quite unnecessary to suppose the existence of a supplementary ovary: the well-known law of the persistence of habit will sufficiently account for the phenomenon. The nervous system automatically reproduces congestion of the generative apparatus. The process seems to continue from its own momentum for a while,

and finally becomes slowed and ceases because of the lack of further impulse. Another factor which may cause the temporary prolongation of the menstrual molimen is the existence of any impairment of the mucous membrane or substance of the uterus, such as always remains after the performance of ovariotomy for a fibroid tumor, and is apt to be present after removal of the appendages for obstinate cases of oöphoro-salpingitis. Therefore I consider it essential in such cases to follow the principal operation by a complementary curetting of the uterus.[16] Czempin[17] attaches some value, as a factor in the process, to the passive congestion due to the compression of veins by the cicatricial tissue resulting from the operation. The amenorrhœa following ovariotomy is accompanied by certain general physical changes: an increase of embonpoint, atrophy of the mammary glands, and sometimes a marked change in the disposition which often becomes more placid.[18] Removal of the Fallopian tubes alone does not seem to influence menstruation, providing that the ovaries be healthy,[19] which fact upsets Lawson Tait's theory of the paramount influence of these organs upon this function.

Primary amenorrhœa may be due to malnutrition, which causes a delay in general development. Over-stimulation of the intellectual faculties, with too little physical exercise, a condition of things found in certain convents and schools, may cause amenorrhœa as well as chlorosis. Weakly young girls with a strumous taint are especially predisposed to it. On the other hand, the change of regimen, the rapid substitution of an abundant and stimulating diet, and the absence of their accustomed exercise in the open air in young girls who are transplanted from a country to a city home, while causing sudden plethora, often causes a delay in the appearance of the menses.

Secondary amenorrhœa may follow impoverishment of the blood, and the profound debility resulting from a chronic disease or following an acute illness. Anæmia, chlorosis, Bright's disease, diabetes,[20] alcoholism,[21] morphinism,[22] cancerous or malarial cachexia, pulmonary tuberculosis, convalescence from fevers, are all potent in producing amenorrhœa; acute or chronic surgical affections may act in the same way. These facts, which have recently elicited much study, were observed and commented on by Dupuytren.[23] It is to the profound anæmia accompanying the onset of the diathesis to which we must attribute the amenorrhœa of syphilitic women upon which A. Fournier[24] lays such stress, and that of young women who are the victims of obesity,[25] often a most debilitating dystrophia. The condi-

tion of the nervous system has a decided influence upon the production of amenorrhœa. Fright may cause a temporary suspension of the menses. On the other hand, there are cases on record where amenorrhœa has been cured by some sudden emotion.[26] The amenorrhœa of prisoners and of insane women confined to asylums is due as much to the mental depression as to the anæmia consequent upon seclusion. Chlorosis, which causes amenorrhœa, seems to be a disease of the nervous system. Absence of menstruation is often noted in the hysterical. Sudden chilling, which is often given as a cause of amenorrhœa, probably acts through the vaso-motor tract. The emotional amenorrhœa of the newly married, or of women who are very desirous of having children, is probably to be referred to the inhibitory power of the nervous system; its occurrence simultaneously with tympanites has often been the cause of bitter disappointment. Anxiety may induce amenorrhœa in women who, because of the irregularity of their lives or from some other reason, dread pregnancy (Raciborski).[27] I have seen several instances of this. The last two forms may be due in part to auto-suggestion.[28] Atrophy of the uterus from superinvolution after repeated pregnancies, prolonged lactation, etc., causes amenorrhœa.[29]

Symptoms.—The chief sign is of course the absence of the periodical flow through the genital tract. But we should not overlook the accompanying nervous symptoms which may be very serious, and which occur in the form of chlorosis or of hysteria. Sensory disturbances, such as impairment of vision[30] and of hearing, and paraplegia,[31] seem to depend as much upon anæmia as upon hysteria.

Amenorrhœa in some patients is accompanied by the cutaneous eruptions which in other women occur during menstruation—acne, eczema, herpes, urticaria, pemphigus, erysipelas.[32] Hyperidrosis and a swelling of the hands and feet have been known to occur, doubtless from angio-neuroses.[33]

These curious facts lead naturally to the study of vicarious menstruation,[34] as they demonstrate the harmony existing between different parts of the organism, and the possibilities of an interchange of function between the external integument and the uterine mucous membrane. Science has on record some curious examples of what may be called substituted secretions. Jones[35] reports the case of a young woman in whom menstruation was checked apparently from sudden chilling, who then suffered from amenorrhœa, and for five years had, instead of the menstrual flow, an abundant flow of milk

from the breasts, which lasted thirty-six hours. In another woman, who had borne several children, the catamenial period was characterized by a profuse diarrhœa for three days, accompanied by leucorrhœa, with a subsequent scanty discharge of blood. He also mentions a case in which periodical leucorrhœa replaced the normal flow.

Vicarious or ectopic[36] menstruation is met with in the most extraordinary and unexpected forms.[37] The discharge most frequently occurs from the bronchial or pulmonary[38] mucous membrane, the patient having hæmoptyses, which may lead to a diagnosis of incipient phthisis. Hæmatemesis has been observed, and epistaxis, rectal hemorrhages,[39] especially in plethoric patients with hemorrhoids—and otorrhagia[40]—either where a pre-existing purulent otorrhœa had made this portion of the frame a locus minoris resistentiæ, or when the tympanum was intact. Of rarer occurrence are cutaneous hemorrhages in the form of ecchymoses and petechial spots, or a flow of blood from the surface of some one special point where the skin is unbroken[41] or from the surface of an ulcer. In the hospital of Saint-Louis I saw a patient, suffering from lupus of the face, who had an abundant flow of blood in this situation at each menstrual period.

Treatment.—It is a mistake to suppose that amenorrhœa calls for special medication supposed to have an elective action upon the uterine mucous membrane. Emmenagogues—rue, savine, saffron,[42] apiol[43]—are of use only in a few limited cases, where some decided influence (as cold, or violent emotion) has caused a suspension of the menses, and should be administered with moderation at the time the flow is expected. The same may be said of hot baths (104° to 113° F.). Drastic and saline[44] purgatives may then be given for the purpose of causing a certain amount of pelvic congestion. Of late, permanganate of potash[45] has been recommended as almost a specific. As a rule, we should try to reach the cause of the disease, and, amenorrhœa depending usually upon poverty of the blood or upon some nervous trouble, we must have recourse to nutrition, tonics, and alteratives, especially iron or manganese[46] or hydrotherapy. I depend much more upon this general treatment than upon such measures as scarification of the cervix, application of a galvanic pessary, etc. Electricity (faradic) may give good results, and should not be omitted. Bigelow[47] recommends static electricity (franklinization) for the amenorrhœa of chloro-anæmic girls, as a general tonic. In the intermittent form of amenorrhœa found in plethoric patients, we may use the continuous current, placing the positive pole in the uterine cavity. In the un-

married, one electrode may be placed upon the lumbar region, and the other externally over the site of the uterus; in the married it is better to place one electrode in the uterus and the other on the hypogastrium. Bigelow also advocates general electricity for amenorrhœa, one electrode being placed on the back of the neck, and the other in a foot-bath of salt water. He finds this particularly useful in the case of young girls who are irritable, nervous, and chlorotic. The treatment should be started a few days before the period is due, and be taken daily until that time. Physical exercise, walks in the open air, gymnastics, sea or mountain air, amusements, and distraction from all anxiety are to be prescribed as well.

Where amenorrhœa occurs in young women who are obese or threatened with obesity, I have often caused a return of the menses by treating the obesity, prescribing a diet free from fluids and starchy foods, exercise, thermal baths (Brides, Saliès de Bearn), and finally by stimulation of the uterine mucous membrane by curetting, followed by iodine injections at the date that menstruation should occur.

In women in whom amenorrhœa follows an ovariotomy, it is not unusual in the first few months to observe periodical disturbances [practically identical with those which occur at the physiological menopause]—lumbar pains, flashes of heat, vertigo, and a special form of irritability; in short, a molimen which is all the more painful because it is longer in duration than the normal crisis. In these cases I have obtained good results from scarifying the cervix and obtaining a slight local bleeding every month at the time of the disturbance. I also use saline purgatives. One of my patients came to me regularly for a year to obtain the relief afforded by this treatment. In the end, these phenomena disappear spontaneously.

Menorrhagia.

A notable increase in the menstrual flow constitutes menorrhagia; a discharge of blood in the interval between the periods is called metrorrhagia.

Symptoms.—A profuse and prolonged flow, the formation of clots, and general debility are the symptoms of what is not in itself a disease, but a symptom of several diseases.

Etiology—Pathology.—The cause may be general or local.

1. General causes act by altering the composition of the blood; to this class belong the various dyscrasiæ, hæmophilia, purpura, scorbutus, severe icterus, phosphorus poisoning, Bright's disease, Werlhof's

disease, obesity, and cachexia. Sometimes in these cases amenorrhœa alternates with menorrhagia. Finally, uterine epistaxis (Gubler) may mark the onset of fevers.

2. The local causes are:

A. *Reflex stimulus* from the genital organs (especially the appendages), without any existing lesion, simply from nervous derangement, as at puberty, first intercourse, or the menopause. We must include in this class the metrorrhagia caused by lactation,[48] which is no doubt due to reflex stimulation from the mammary glands.

B. Nearly every disease of the uterus and its appendages; endometritis, fibromata, cancer, ovarian tumors,[49] especially those situated near the uterus, as intraligamentous cysts, and affections of the Fallopian tubes. As in this chapter I do not pretend to do more than outline the diseases causing menorrhagia, I shall content myself with this enumeration, without going into descriptive details; each affection will be found described at length under its appropriate heading.

Treatment.—Unless this symptom threaten serious danger, it need not be treated by itself, but the cause should always be sought for. A mere mention of the hæmostatic measures at our command will suffice. The local means are: prolonged irrigations of very hot water (110° to 120° F.) and tamponade of the vagina. Emmet was the first to use temporary suture of the cervix, which may be done if all other measures fail.[50] I have seen Martin ligate *en masse* the inferior branches of the uterine artery through the vaginal culs-de-sac (p. 117), with successful result.

General measures are to be simultaneously employed; rest in bed, with slight elevation of the pelvis; opium in the form of laudanum; rectal injections; ergot,[51] by the stomach and hypodermatically. Gallard places a high value upon the infusion of digitalis leaves[52] given to the point of toxic effect.

[In many cases fluid extract of hydrastis given in half-drachm doses every four hours during the time of the flow, and in twenty-drop doses before meals in the intervals, is very efficient. Oil of erigeron in 5-minim capsules every three hours is also effective. Goodell speaks confidently of the value of the following:

℞ Extr. ergotæ fl., ...	♏ x.	gm.	.65
Ammonii chloridi, ...	gr. x.	"	.65
Sodii bromidi, ...	gr. v.	"	.31

Misce et signa: For one dose, to be taken in half a tumbler of water; may repeat every two hours.

All of these measures are only palliative and of very slight importance compared with the treatment of the causal factor of the bleeding.]

If menorrhagia becomes threateningly severe, would it be justifiable, in the absence of an exact diagnosis, to perform a radical operation? Vaginal hysterectomy has in some cases seemed justifiable, for a hemorrhagic endometritis which resisted all other treatment (p. 212). Some operators have performed ovariotomy, which is a less serious operation and quite as efficacious.[53]

Olshausen mentions the case of a woman of thirty-nine years who suffered from such severe menorrhagia, with no discoverable cause, that he performed an ovariotomy, with the greatest success. Yet we should beware of creating a therapeutic law out of such exceptional cases, and Walton[54] has quite justly protested against the over-zeal for operation of some surgeons.

Dysmenorrhœa and Menstrual Disorders of Nervous Origin.

At the menstrual period, women normally feel unwell, as they express it; that is to say, they experience a general malaise, a few vague pains in the loins, and a certain irritability of temper. These symptoms are, however, not at all pronounced. If menstruation becomes painful it is called dysmenorrhœa, which has been divided and subdivided into: 1st, Neuralgic or sympathetic dysmenorrhœa; 2d, congestive or inflammatory; 3d, mechanical or obstructive; 4th, membranous; 5th, ovarian. This classification may be simplified by grouping the pains under two heads, according to whether they occur during the ovarian-tubal period (ripening of the follicle) or during the uterine period (expulsion of the menstrual blood).

Dysmenorrhœa of Ovarian Origin.

This may be the result of incomplete development of the genital organs, the ovaries and uterus being of the pubescent variety; or this may be the case with the uterus alone, the ovaries having attained an adult development. A want of regularity in the function of menstruation will of course result from the difficulty of ovulation, or from the disproportion existing between the intensity of the congestive phenomena in the ovaries and that in the uterus; which produces an exaggerated erethism in the ovaries, with consequent suffering.

Disease of the appendages is another frequent cause. I do not refer to acute inflammations only, or to serious affections, as salpingitis, hydro-, hæmato- and pyo-salpinx. But the remains of old lesions (often limited in extent), adhesions, false membranes compressing the uterine appendages or binding them down in an abnormal position (producing sclerosis of the ovaries and obstruction of the tubes), are the frequent but unrecognized cause of intense pain at the menstrual period. Tubo-ovarian varicocele (Richet), or varicose dilatation of the pampiniform plexus and the veins of the broad ligament, seems to have some causative influence; a varicose condition is, moreover, usually accompanied by chronic ovaritis and ovarian atrophy, just as, in the male, it may be followed by atrophy of the testicle.

Dysmenorrhœa of Uterine Origin.

The principal factor is the existence of any mechanical obstacle to the expulsion of the blood; stenosis of the cervix with or without hypertrophy; displacements of the uterus, especially flexions; endometritis (causing swelling of the mucous membrane, and salpingitis); the various forms of tumors, fibroids, mucous polypi, cancers, etc. I have described, under the head of acute endometritis, the special form which is accompanied by complete desquamation of the mucous membrane, and which many authorities have described as a separate disease, membranous dysmenorrhœa.

Can we recognize a dysmenorrhœa due to the rheumatic or gouty diathesis? I think not, and that we are only justified in saying that patients suffering from these complaints are liable to every form of neuralgia.

Symptoms and Diagnosis.—The pain of dysmenorrhœa differs widely according to its origin. At the onset of menstruation the ovarian pains predominate; the uterine pains are the most pronounced when the flow becomes fully established.

Inter-menstrual Dysmenorrhœa (Mittelschmerz, of the German authorities) is erroneously so called. The name has been applied to spasmodic pains in the ovarian region, occurring in the intervals between the menses, and hypothetically attributed to ovulation.[55] These are really symptoms of inflammation of the uterus or the appendages.

I have already described[56] the character of dysmenorrhœal pain, and shall not here dwell upon it at length.

As a rule, the pain makes its appearance with the flow, and is especially severe on the first two days. Sometimes, even when there is

no mechanical obstacle and no narrowing of the cervical canal, the blood is discharged drop by drop (like the urine in strangury), a phenomenon which Aëtius called stillicidium uteri. Small clots indicate a stagnation of blood in the uterine cavity, and their expulsion may cause spasms of colicky pain so intense as to produce hysterical attacks and even syncope.

The menstrual period may for a long time be a period of actual relief to the patient, and then become exceedingly painful; this is specially noted in cases where salpingitis passes from the acute to the chronic state.

The differential diagnosis consists in distinguishing dysmenorrhœa from lumbo-abdominal neuralgia, which is increased at the menstrual period; the coexistence of neuralgia in other localities, and the identification of Valleix's painful points will facilitate the diagnosis. To determine whether the pain is of ovarian or uterine origin, a careful study of local conditions will be necessary. The phenomena preceding menstruation will assist us in forming an opinion.

This question of diagnosis occurs in regard to the various uterine diseases of which I have spoken.

I would call especial attention to the dysmenorrhœa and the grave reflex phenomena which may be produced by prolapse of the ovary. By vaginal or rectal touch we shall be able to find a tumor in the pouch of Douglas, pressure upon which causes a peculiar and characteristic nauseating pain. Two accompanying symptoms are, pain during defecation and coition, dyschezia and dyspareunia of the English books.[57]

Battey, and many other gynæcologists following his teachings, especially in America, attach much importance to the coexistence of menstrual disorders, amenorrhœa and dysmenorrhœa, with grave nervous disorders, hysteria, epilepsy, mania; they have even created the terms oöphoralgia, oöphoro-epilepsy, oöphoro-mania. Beyond doubt, many of these affections are of reflex origin, and proceed from undeveloped or diseased ovaries. But an exact diagnosis is difficult to reach, and the surgeon should be more guarded in his opinions than many have been on the other side of the Atlantic. There are a few clearly defined cases where the preponderating influence of the menstrual epoch is recognized beyond question, and the congested ovary is the cause of the aura of epilepsy for instance; there are many more where the menstrual disorders merely coincide, without being causative.

As palliative treatment for the pain, we may use potassium bromide, chloral,[58] valerianate of ammonia, asafœtida,[59] musk, tincture of cannabis indica, belladonna, and hyoscyamus.[60] Antipyrine[61] hypodermatically injected is a valuable resource; intense spasms of pain may be relieved by the careful administration of a few whiffs of ether. Oxalate of cerium[62] has been extolled. Wylie[63] praises electricity; he inserts the positive pole in the cervix.

Laudanum and valerian douches often afford relief when all other remedies fail. General treatment will attempt to reach the anæmic or nervous condition of the patient.

[Routh[64] in an excellent resumé of the subject writes: "Successful treatment depends upon finding and removing the cause. As a rule it is irrational to mask the symptom of pain by giving opiates, though during a severe paroxysm it may be necessary; but even then we should add atropine, belladonna, or hyoscyamus, to relax muscular spasm, to avert constipation, and to enable us to use smaller doses of the opiate. The main objection to opium, chloral, or alcohol is that their repetition tends to their abuse. Nitro-glycerin and amyl nitrite are excellent for spasmodic cases. The bromides are indicated in those cases where the dysmenorrhœa is supposedly ovarian. Cannabis indica is valuable when menorrhagia coexists. A favorite prescription, both in congestive and spasmodic dysmenorrhœa is:

℞ Tr. cardamomi comp.,	ʒ ss.	gm. 2.
Spir. chloroformi,	♏ xx.	" 1.3
Liq. ammonii acetat.,	℥ ss.	" 15.5
Tr. belladonnæ,	♏ x.	" 0.65
Aq. cinnamomi,	q.s. ad ℥ i.	" 31.

M. S. For one dose.

I have found the tincture of pulsatilla, given for some days before the period in five-drop doses three times daily, quite efficient in the neuralgic form common in young women. In congestive dysmenorrhœa saline laxatives, hot sitz-baths, and fifteen to twenty grain doses of phenacetin every six to eight hours are effectual. For obstructive dysmenorrhœa thorough dilatation of the uterine canal gives the best results. All internal medication is uncertain.]

No general rule can be given about curative treatment, which will vary according to the cause of the dysmenorrhœa. The initial lesion, whether it be in the uterus or the appendages, is the one to be treated.

Where there is doubt about the existence of this lesion, or where the trouble is functional and its origin not well determined, the therapeusis is difficult. In many cases where the trouble is due to a delay in the perfect development of the internal genital organs, with or without cervical stenosis, it will often disappear spontaneously with age, marriage, and conception. In some cases, however, the ovaries and uterus whose functions are unequally performed, do not become restored to a normal condition; in other cases, acquired lesions (adhesions, displacements) permanently impair the functional powers of the ovary. The periodical pain becomes unbearable and the general health deteriorates. Moreover, it has been supposed that grave nervous disorders, epilepsy and mania, were of reflex origin, due to the dysmenorrhœa; it is in these cases that removal of healthy ovaries has been performed in order to stop the pain by abolishing the function which caused it. The special indication for oöphorectomy, castration, or normal ovariotomy (a term signifying that the ovary is of normal size), was first pointed out by Battey[65] in America, then by Hegar[66] in Germany, and Lawson Tait[67] in England. According to Battey,[68] whose name the operation bears, the surgeon, before performing an ovariotomy in such cases, should ask himself: 1st. Is the case a serious one? 2d. Is it curable by any other medical or surgical means? 3d. Can it be cured by the menopause?

The last question is, in truth, the all-important one. Ovarian pain in itself is not enough to prove that the ovary is the starting-point of the trouble: there is an ovarian congestion accompanying hysteria; moreover, neuralgic pains of central origin may radiate centrifugally. Sound teeth are frequently rendered sensitive by neuralgia of the trigeminal; no one would dream of extracting them.[69] This very appropriate comparison of Olshausen has been met by the reply that, normal ovariotomy being a benign operation and the pain suffered of an excruciating nature, many patients would be willing to submit to the operation for the uncertain chance of a cure. It would at least put a stop to the exacerbation of pain at the menstrual period.

Lawson Tait has had encouraging results with ovariotomy in the cure of menstrual epilepsy. Yet G. Willers, a pupil of Hegar, has proved that there is more chance of cure if the ovary be diseased than if it be healthy. The same is true of hysteria and hystero-epilepsy with acute exacerbation at the menstrual period.

Ovariotomy has given some good results[70]—it has also resulted in many failures. Some of the cures are quite remarkable, but they may

be only temporary[71] in their effect, and often no cure follows. We must also ask ourselves whether the cures may not oftentimes be due to the deep psychical impression produced by the operation—to a species of suggestion, in short. As a proof of this being possible, we would instance the good effect produced in a few cases by a pretended ovariotomy.[72] As to ovariotomy for mania or psychoses apparently influenced by menstruation, I believe that it should be prohibited. In some cases of this kind the trouble has been aggravated instead of cured by the procedure. It is difficult to appreciate the point of view of those surgeons who practise ovariotomy for the purpose of producing sterility and preventing the transmission of hereditary insanity.[73] I have as yet said nothing as to the anatomical condition of the ovaries. In spite of Hegar's praiseworthy efforts to restrict ovariotomy to cases where lesions of the ovary can be demonstrated, and to give this operation an anatomical basis, even when it is performed for nervous conditions only, it is an undoubted fact that in the great majority of cases such positive diagnosis cannot be made.[74]

Sclero-cystic degeneration, cirrhosis, and hyperplasia of the stroma are rarely recognizable by bimanual palpation; and as for the symptoms produced by these lesions, they differ in nowise from those of purely nervous origin.

It seems to me beyond doubt that removal of even healthy ovaries has often modified the condition of the nervous system so as to cause a disappearance of the grave reflex disturbances accompanying menstruation.[75] Consequently the operator should be less anxious to know whether the ovary to be removed presents an anatomical lesion, than to know whether it be the physiological starting-point of the trouble; rational symptoms will in this case tell him more than physical examination. But an absolute diagnosis is difficult to establish; and unless he be very positive as to the cause, a conscientious surgeon will hesitate to perform an operation which, when it does not cure the disease, constitutes a mutilation of the patient, which, from a social point of view, is more serious than the amputation of a limb.

Péan[76] prefers vaginal hysterectomy, which he calls uterine castration, to ovariotomy; he finds it more efficacious, even in overcoming the nervous troubles, than removal of the ovary. His theory seems *à priori* untenable, on account of the greater richness of the nerve supply to the ovary; moreover, oöphorectomy is a much less serious operation than hysterectomy.

Technique of Ovariotomy.—I have already described this opera-

tion when speaking of the indirect treatment for fibroids (p. 316): a few special points are worthy of notice in this connection.

The abdominal incision should be as small as possible, since only the ovary and tubes are to be withdrawn through it, and there is no great amount of groping necessary, nor is there anything to remove that offers any great difficulty; moreover, it is always an easy matter to enlarge the wound if necessary. From two and a half to three inches is large enough; the centre of the incision should be placed directly over the fundus of the uterus, which can be exactly located by bimanual palpation; the inferior end of the wound will usually be about two fingers' breadth from the pubes. Battey, at least in his first operations, removed the ovary only. Hegar,[77] in the very beginning, realized the value of removing the tubes as well—a procedure which facilitates, rather than adds any difficulty to, the operation. Lawson Tait[78] also considers it of paramount importance, and his opinion has had great influence in transforming oöphorectomy into salpingo-oöphorectomy.

The cicatrix left by so small an incision as that made by Lawson Tait is unimportant, especially if my advice be followed in regard to uniting the abdominal walls by three successive layers of buried catgut suture.

Vaginal incision possesses no particular advantages. Yet if the patients object decidedly to an abdominal cicatrix, it may be used,[79] especially if the ovaries are prolapsed and easily reached. The prolapse of the ovaries may be recognized by vaginal touch, in Douglas' cul-de-sac; and by the two characteristic symptoms, pain during defecation and coition.

If the uterus be freely movable, the operation is of extreme simplicity. The patient is placed in the dorso-sacral position, a short Simon speculum presses down the fourchette, the cervix is brought into view by a tenaculum, and an assistant keeps down the uterus by pressing upon the hypogastrium. A transverse incision about two inches long is made in the posterior cul-de-sac as near as possible to the uterus. The index and middle finger are introduced into the pouch of Douglas and bring down the ovary and tube, about which a ligature is carried with a blunt needle, and tied with a Tait's knot. If the nervous symptoms are very marked, it is better to remove the appendages of both sides, even if one ovary only be prolapsed; for the induced menopause has a greater therapeutic value than removal of the displaced organ. Should there be no complication and no

special indication for drainage, the wound can be completely closed by catgut sutures.

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3. Campbell, cited by F. Müller: Die Krankh. des weibl. Körpers, 1888, p. 226.

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7. Fox, quoted by Harris: Amer. Journal of Obstet., vol. iii., p. 616. Willard: Ibid., p. 638.

8. Horwitz: Petersburg Med. Zeitung, Bd. xiii., p. 221. In this article will be found a review of most of the cases known at the time it was written; the history might be filled out by Wallentin's work, given below. Here is an outline of the cases most recently reported. A. Van Derveer: Amer. Jour. of Obstetrics, 1883, p. 1,008. Child who has menstruated since the age of four months; menses appear every twenty-eight days, lasting four or five days. At the age of two years and seven months she looked like a girl of ten or twelve years; breasts and external genitals well developed. Cabadé: Gazette Médicale de Paris, October 6th, 1883. Girl who menstruated at eight months. Rapid development of external genitals. Wallentin: Dissert. Inaug., Breslau, 1886. Menses appeared at one year and three months. Breasts and external genitals well developed. The child was very large for six and a half years. Height forty-eight inches, weight sixty pounds, whereas, according to Gehrard, the average height for a child of six years is thirty-nine inches and weight forty-two pounds. This work contains a report of all cases known up to date. Casati: Il Roccoglitore, October 30th, 1886. Rachitic child, who began to menstruate at six years one month. Breasts and external genitals well developed. Rectal touch showed a uterus pubescens. Loriot: Annales de Gynécologie, April, 1887. Little girl of four years menstruating. Reported to Sociéte de Gynécologie de Paris. Bernard: Lyon Médical, August 14th, 1887. Young girl who had menstruted from birth until the age of twelve without development of genital organs. Profound mental emotion upon the part of the patient caused its disappearance, and it afterward came at irregular intervals. She married at the age of twenty, contracted syphilis from her husband and died at twenty-seven years from cancer of the uterus. Bernard questions (without a plausible reason, however) whether the precocious menstruation could have predisposed her to cancer. Diamant: Intern. Klin. Rundschau, 1888, No. 40. Child of six years with breasts and external genitals as fully developed as a girl at puberty. Dentition was complete at the end of the first year; at the age of two years menstruation began, lasting four days. At six years the menses stopped and had not yet appeared when the child was examined six months later. Epileptiform attacks replaced the menstrual periods. Kornfeld: Centr. f. Gyn., 1888, p. 395. Child of three years, whose father was insane and had taught her to masturbate. Menses appeared for

three months; no further details obtainable; masturbation; normal mental condition.

9. Beigel: Krankh. der weibl. Geschlechtsorgane, vol. 1. Obs. of Flint South.

10. Siredey: Article Ménorrhagie in Dict. de Méd. et de Chirurg. Pratique de Jaccoud.

11. Barié: Étude sur la Ménopause. Thèse de Doctorat, Paris, 1877. Kisch: Das klimakt. Alter bei Frauen, p. 44. Barker: Phil. Med. Times, December 12th, 1874. Knox: Menstruation in Old Age. Medical Record, 1888, No. 9, p. 538. A. Marx (Przeglad Lekarski, 1889) reports a case where menstruation appeared at the age of forty-eight and lasted regularly for four years.

12. Warnel refers to a case which strikingly illustrates the necessity for local examination where there is amenorrhœa: Obstet. and Gyn. Soc. of Moscow; reviewed in Annales de Gyn., January, 1890, p. 43. The patient was a multipara of fifty-three years, in whom the menses stopped very suddenly. An abdominal tumor made its appearance, and the patient died of peritonitis, in spite of an attempt to evacuate through the vagina the blood which was retained in the uterus. The cervix was obliterated, and this atresia was probably due to a long-seated stenosis which had been unrecognized.

13. Saint Martin (Journal d'Accouchement 1888, No. 18) reports a case where menstruation persisted all through pregnancy, and another in a woman of twenty-four who had never menstruated.

14. L. Mayer: Berlin. Beitr. zur Geb. und Gyn., ii., p. 124. Raciborski: Traité de la Menstruation, Paris, 1861.

15. Storer: Amer. Jour. of Med. Sciences, Jan., 1866, p. 119. Voss (Sweden): Centr. f. d. med. Wissensch., November 27th, 1869. Goodmann: Richmond and Louisville Med. Jour., 1875, and Annales de Gyn., 1876. Terrier: Gazette Hebdom., December 15th, 1876, and December 25th, 1878. Malins: British Med. Jour., 1880. Ormières: Sur la Menstruation après l'Ovariotomie et l'Hystérectomie. Thèse de Doct., 1880 (Ormières has collected forty-five cases). Campbell: Amer. Gyn. Soc. of Philadelphia, September, 1885; Centr. f. Gyn., 1884; 348. Hennig: Ueber Menstruation nach doppelter Oöphorotomie. Obst. Soc. of Leipsic, November, 1887, in Centr. f. Gyn., 1888, p. 360. Tuttle: Regular Menstruation after Tait's Operation. Amer. Jour. of Obstet., 1888, p. 612. Bantock (British Gynæc. Journal, February, 1889) quotes several cases where menstruation persisted for a long time after ablation of the ovaries. Macario, Quénu, Terrillon: Bull. Soc. de Chir., 1889, p. 31. L. Tait: Menstruation and the Ovaries. Lancet, 1888, ii., p. 104. Roland Pichevin: Des Abus de la Castration chez la Femme. Thèse de Paris, 1888. Glaevecke (Arch. f. Gyn., 1889, Band xxxv., Heft 1) has reached the conclusion that menstruation ceases completely in 88 cases out of 100, immediately after removal of the ovaries or after a short lapse of time. In 12 out of 100 cases there is a scanty and irregular flow. In 50 per cent of the cases the molimen persists, and about the same proportion of the patients develop great embonpoint.

16. Sänger, out of 49 cases of ovariotomy, has noted only two where the menstrual flow persisted; in one of them, where the operation was done for a retroflexion complicated by endometritis, the surgeon did not hesitate to open the abdomen a second time to ascertain the condition of the stump; there was not a trace of the appendages to be found. The part taken by the endometritis was revealed by the fact that the hemorrhages disappeared after curetting. In the second case, ovariotomy was performed for multiple myomata. Menses persisted for a year somewhat less in amount. Sänger attributes this to endometritis and intends to curette. Obstet. Soc. of Leipsic. Centr. f. Gyn., 1888, p. 361.

17. Czempin: Zeits. f. Geb. und Gyn., Bd. xiii., Heft 2.

18. Glaevecke: Körperliche und geistige Veränderungen in weibl. Körper nach künstl. Verluste der Ovarien. Arch. f. Gyn., 1889, Bd. xxxv., Heft 1.

19. J. L. Championnière (Répertoire Univers. d'Obst. et de Gynéc., 1888, p. 220) quotes a case where menstruation remained perfectly normal after a double salpingotomy, where the perfectly healthy ovaries were left undisturbed.

20. Cohn: Zur Kasuistik der Amenorrhöe bei Diabetes mellitus und insipidus. Zeitsch. f. Geb. und Gyn., Bd. xiv., Heft 1, 1887. Lécorché: Du Diabète Sucré chez la-Femme, Paris, 1886, p. 171.

21. C. H. Carter: Amenorrhœa Associated with Alcoholism. Brit. Med. Jour., 1888, p. 1,383.

22. Roller: Ueber das Verhalten der Menstr. bei Anwendung von Morphium und Opium. Berlin. klin. Woch., 1888, No. 48.

23. Dupuytren: Leçons Orales, vol. ii., p. 305, and Bull. de l'Acad. de Médec., September, 1838. He quotes a work of Brièrre de Boismont, which was thought worthy of a prize by the Academy, in which he discusses the influence of disease upon menstruation. Dupuytren adds, "We have often noted a disturbance or suppression of the menses, during the course of an acute or chronic surgical affection, or after a major operation." (A lengthy discourse follows, upon delay or acceleration of the function, the discharge of the flow through the wound, etc.) This study has been taken up by Terrillon. Progrès Médical, 1874, p. 737.

24. Fournier: Leçons sur la Syphilis chez la Femme, Paris, 1873.

25. A. F. Currier: The Influence of Obesity in Young Women upon the Menstrual and Reproductive Functions. Med. Record, 1888, No. 6, p. 162.

26. R. J. Robert (British Med. Jour., November 16th, 1889) gives an account of a case where fright caused the return of a flow which had been suppressed for nine months.

27. Raciborski: Traité de la Menstruation.

28. The power which suggestion possesses upon the menstrual function has been proved by numberless experiments. I saw an hysterical patient in the Asylum of Villejif, in whom Marcel Briand was able, by suggestion, to cause an advance or delay of several days in menstruation. Consult Bernheim: Sur un Cas de Régularisation de la Menstruation par Suggestion. Arch. de Tocologie, 1887, p. 891. Kobylinski: Dysménorrhée Guérie par la Suggestion. Wracz, 1887, No. 47. Hugenschmidt: Treatment of Dysmenorrhœa by Mental Suggestion or Hypnotism. Medical and Surgical Reporter, Philadelphia, 1888, vol. ix., p. 458.

29. W. Levinstein: Centr. f. Gyn., No. 40, 1887.

30. Abadie: Traité des Maladies des Yeux, vol. ii., 1877. Dehenne: Rapports Pathologiques de l'Œil et de l'Utérus. Annales de Gyn., 1879. Mooren: Gesichtsstörungen und Uterinleiden. Arch. f. Augenheilkunde, Bd. x., 1881. Karafiath: Erblindung mit acuter Papillo-retinitis bedingt durch Ausbleiben der Menstruation. Centr. f. Gyn., 1884, p. 270. Clifton S. Morse: New York Med. Jour., 1887, January 22d, p. 95.

31. J. W. Bowee: Suppressio Mensium and Paralysis of Lower Extremities, Resulting from Nostalgia; Local and General Faradization; Cure. Obstet. Gazette, Cincinnati, 1888, vol. xi., p. 285.

32. Danlos: Des Eruptions Cutanées à l'Epoque des Règles. Thèse de Doct., 1874. G. H. Rose: Amer. Assoc. of Obstet. and Gyn., Sept., 1888, analyzed in Ann. de Gyn., January, 1889, p. 66. Stiller: Berlin. klin. Woch., 1877, No. 50. Wilhelm: Ibidem, 1878, No. 4. Schramm: Ibidem, No. 42. Wagner: Allgem. med. Centralzeitung, No. 94. Rouvier: Phénomènes Supplémentaires des Règles. Annales de Gyn., 1879. Joseph: Ueber die Beziehung von Dermatosen in Genitalkanalerkrankungen des Weibes. Berlin. klin. Woch., 1879. J. Heitzmann: Vicaräende Menstruation und Menstrual-Exanthem. Wiener med. Jahrbücher, 1884, Heft 1.

33. Borner: Ueber Nervöse Hautschwellung als Begleiterscheinung der Menstruation und Climax. Samml. klin. Vortr., 1888, No. 90, p. 312.

34. Teplischin: Med. Rundschau, 1888, No. 1.

35. G. E. Jones: Trans. of the Obst. Soc. of Cincinnati. Amer. Jour. of Obst., 1887, vol. xx., p. 92.

36. This curious phenomenon has long been known. Stahl: De Mensium Viis Insolitis, Halle, 1702. A. de Haller (Elementa Physiologiæ, tome vii., livre xxviii., sect. iii., ¶ 14, Lausanne, 1778) describes with accuracy, quæ mensium locum tenent. Consult Scanzoni: Loc. cit., p. 277. Courty: Loc. cit., p. 473. Puech: Comptes Rendus Academ. des Sciences, December 9th, 1861. L. Torthe: D'Une Forme Rare de Deviation Menstruelle. Thèse de Paris, 1877. Lorey: Des Vomissements de Sang supplémentaires. Thèse de Paris, 1878.

37. Camiade: Thèse de Paris, 1872.

38. R. Thomas: Amer. Jour. of Obst., 1886, p. 14. C. O. Wright (Amer. Jour. of Obst., 1887, xx., p. 88) reports three cases.

39. Baratt: London Med. Record, reviewed in Archives de Tocologie, 1876.

40. Gilles de la Tourette (Progrès Médical, 1882, No. 35) reports the case of a girl of eighteen years, who since the age of twelve years had a purulent discharge from the ears. At the age of fourteen she awoke one night to find herself bathed in blood which had escaped from them. Since that time, the same thing has occurred regularly every three weeks; once only the menstrual flow occurred in the normal manner. Stepanow (Med. Rundsch., No. 19, 1885) speaks of a young girl of seventeen, an hysterical subject, in whom the tympanum is imperforate and the ears are in an apparently sound condition. Yet the menstrual flow is discharged from them and lasts two days. He alludes to three similar cases of Ménière's in which, however, the ears were diseased, and to cases of Jacobi, Benni, Henzinger, Huss, and Lang.

41. Stear (Lancet, May 13th, 1881) observed a vicarious menstruation from the mammary glands; woman was fifty years old; the hemorrhage began twelve months previously. Gordon (Amer. Jour. of Obst., April, 1882, p. 343) gives the following account: Woman forty-one years old, of vigorous constitution. For seven years past the menses have ceased, and the flow of blood, which lasts from three to five days, regularly takes place from a small blue spot at the inner surface of the phalangeal articulation of the thumbs. This flow was interrupted by pregnancy.

42. De Sinéty recommends three-quarters of a grain each of aloes, rue, savine, and saffron, in a wafer, of which one or two may be taken daily.

43. Apiol, the active principle of Apium petroselinum, has been especially recommended by Joret: Bull. Gén. de Thér., February, 1860, and Marotte: Ibid., October, 1863. It is administered in capsules containing four grains each; one given in the morning and one at night, at the menstrual period if there be dysmenorrhœa, or at the time it is due if there be amenorrhœa.

44. The drastics most commonly used are aloes, scammony, jalap, podophyllum, cascara, etc. I give two and a half drachms of the tinct. jalap co. (eau de vie allemande) in a cup of weak coffee. The best tolerated saline purgative is the citrate of magnesia (about ℥ iss.), or some natural mineral water, as Hunyadi Janos, Pullna, Birmenstorff, etc.

45. Boldt (New York): Therapeutic Gaz., 1887, Jan. 15th. P. W. Macdonald: Permanganate of Potassium in the Treatment of Amenorrhœa Associated with Mental Disease. Practitioner, London, 1888, vol. xi., p. 428. Hart and Barbour (loc. cit.) give this formula:

℞ Potassii permanganatis,
Kaolin..... āā gr. ij.
Vaselini..... q. s.
Fiat pilula: mitte tales xxiv.
Sig. One, thrice daily.

46. Watkins: Arch. de Tocol., 1887, p. 514.

47. H. Bigelow: Gynecological Electro-Therapeutics, London, 1889, p. 159.

48. Lande: Sur une Forme de Métrorrhagie Provoquée par l'Allaitement. Journal de Méd. de Bordeaux, 1879.

49. S. Gottschalk: Archiv f. Gynäk., xxxii., Heft 2, p. 234 (pupil of Landau) recently reported a curious case of diseased ovary which gave rise to profuse hemorrhages; it was a veritable cavernous metamorphosis. The uterus and ovaries were removed through the vagina.

50. Koteliansky (Presse Médicale Belge, 1889, p. 380) describes an operation of this nature done by Onoutrieff with the best results.

51. ℞ Freshly pulverized ergot, ʒ i., to be divided into eight powders; one to be taken every three hours. Yvon's ergotin can be given hypodermatically in doses of ♏xv., two or three times in the twenty-four hours; but it is inadvisable to administer strong doses of ergot for any length of time.

52. One and one-half grains of the digitalis leaves in a quart of water to be taken during the twenty-four hours.

53. Hofmeier, quoted Olshausen: Die Krankheiten der Ovarien, 1886, p. 449. Terrillon: Soc. Obst. et Gynécol. (Répertoire Universel d'Obst. et de Gyn., 1888, pp. 194 to 208). Lucas Championnière, ibidem.

54. Walton: Du Drainage de la Cavité Uterine, Gand, 1888.

55. Priestley: Cases of Intermenstrual or Intermediate Dysmenorrhoea, 1871 (reviewed in Jahresbericht, 1872, vol. ii.). Fasbender: Zeitschr. für Geb. und Frauenkr., p. 125. Sorel: Douleur Hypogastrique ou Dysmenorrhée Intermenstruelle. Arch. de Tocol., March, 1887, p. 269.

56. See chapters on Endometritis and Stenosis of the Cervix.

57. Paul Vallin: Situation et Prolapsus des Ovaires. Thèse de Paris, 1887.

58. Dubois: Chloral et Bromure de Potassium dans la Dysmenorrhée. Gaz. Hebd. des Sci. Méd. de Bordeaux, June 5th, 1888.

59. Courty: Traité pratique des Maladies de l'Uterus, 1881, p. 492, recommends one and one-half grains of asafetida in pill form hourly, or 25 to 30 drops of an antispasmodic mixture composed of ℥ 20 gr. each of tincture of valerian, tincture of castoreum, and Sydenham's laudanum.

60. Schaw: The Value of Belladonna and Hyoscyamus in Dysm. Lancet, 1888, ii., p. 570.

61. Dettenbauch: Med. Record, May 21st, 1887. Windelschmidt: Allg. med. Centr. Zeit., Berlin, 1888, vii., p. 1,829.

62. Chambers: Oxal. of Cerium in Dysm. Med. Record, New York, 1888, No. 34.

63. Wylie: The American System of Gynecology, vol. v.

64. Routh: Sajous' Annual, 1889.

65. Battey: Normal Ovariotomy. Atlanta Med. and Surg. Journal, Sept., 1872. His first operation was performed Aug. 17th, 1872.

66. Hegar: Die Castration der Frauen. Volkmann's klin. Vorträge, Gyn., 42, Leipsic, 1878. His first operation was done July 27th, 1872, and therefore preceded Battey's by one month. But Hegar's patient died of peritonitis, and he did not repeat the operation until Aug. 2d, 1876, long after Battey had made known the operation which bears his name.

67. Lawson Tait: British Med. Jour., May 31st, 1879. Diseases of the Ovaries, 1883, p. 327. His claim to priority (Medical News, July, 1886, p. 26) is untenable.

68. R. Battey (of Rome, Georgia): What is the Field of Battey's Operation? Article read before the American Gynecological Society of Cincinnati, quoted by Byford. The Practice of Medicine and Surgery Applied to the Diseases and Accidents Incident to Women, 4th edit., Phil., 1888, p. 672.

69. Olshausen: Die Krankheiten der Ovarien, 1886, p. 452.

70. Heilbrunn, Walton, V. Hoffmann, Bircher, Hegar, etc. See bibliographical references farther on.

71. J. Friedmann, L. Landau and Remak, A. Leppmann, Mundé, etc.

72. Israel: Beiträge zur Würdigung des Werthes der Castration bei hysterischen Frauen. Berlin. klin. Wochenschr., 1880, No. 17. Hegar: Zur Israël'schen Scheincastration. Berlin. klin. Wochenschr., 1880, No. 48. Chiarleoni (Gazzetta degli Ospitali, 1888, Nos. 8, 9, in the case of a hysterical patient of 29 years (amenorrhœa, obstinate vomiting, extreme emaciation), pretended to perform an ovariotomy, by making a superficial incision in the abdomen. Vomiting ceased immediately, sleep and appetite returned. The patient left her bed fifteen days after the operation; the menses appeared a month later.

73. Goodell: Extirpation of the Ovaries in a Woman Suffering from Nymphomania and Incorrigible Masturbation, with the Object of Preventing Propagation of this Mania. New York Medical Record, October 13th, 1883.

74. Hegar (Hegar and Kaltenbach: Operative Gyn., 3d edit., 1886) recognizes this fact when he says, "We have often obtained lasting results from ovariotomy, in cases where a careful examination has failed to reveal anything except a hyperplasia of the stroma of the ovary, or a slight peri-oöphoritis." These lesions are of small importance; he might as well say at once that ovariotomy was often successful when the ovaries were healthy.

75. Bibliographical references relative to the recent performances of ovariotomy for dysmenorrhœa accompanied by nervous and mental derangements. R. Battey: Trans. of the Amer. Gyn. Soc., 1876. M. Sims: British Med. Journal, Dec., 1877. Börner: Wiener med. Wochenschr., 1878, Nos. 47–50. Oweling: Obst. Jour. of Great Britain, Jan., 1879. F. Franzolini: Gaz. Med. Italiana, prov. Venete, xxii., No. 38. Dawson: Amer. Jour. of Obst., 1881, p. 419. Mundé: Ibid., 1883, p. 944. Carstens: Ibid., 1883, pp. 266 and 522. Perette: Berlin. klin. Wochensch., 1883, No. 10. Klotz: Hysterie und Castration. Wien. med. Wochenschr., 1882, Nos. 38–41. W. Goodell: Amer. Jour. of Insanity, 1882, 1-4, and Phila. Med. Times, December 29th, 1883. Maurer: Deutsche med. Wochens., vii., 1882. p. 530. Jesset: Lancet, June, 1882. Landau and Remak: Zeitschr. für klin. Med., vi., 5, 1883, p. 437. G. Thomas: New York Med. Jour., January, 1883. Bern. Heilbrunn: Centr. f. Gyn., 1883, No. 38. Malins: British Med. Jour., May 12th, 1883. Walton: Boston Med. and Surg. Journal, 1884, No. 23. V. Hoffmann: San Francisco Western Lancet, January, 1884. Flechsig: Neurol. Centralbl., 1884, Nos. 19 and 20. Bircher: Castration bei Ovariel Neuralgie und Hysterie. Correspblatt. f. Schw. Aerzte, 1884. Julius Friedmann: Vergleich einiger Fälle von Operat. an den Ovarien wegen Psychose. Inaug. Dissert., Berlin, 1883. Hegar: Archiv f. Gyn., xxiv., Cent. f. Gyn., 1884, p. 593. Zur Castration bei Hysterie. Berlin. klin. Woch., 1880, No. 26. Zur Begriffsbest. der Castration. Cent. f. Gyn., 1887, No. 44. Der Zusammenhang der Geschlechtskrankheiten mit nervösen Leiden, 1885. Spencer Wells: Case of Removal of Both Ovaries for Dysmenorrhœa. Trans. of the Amer. Gyn. Soc., vol. iv., p. 198 L. Tait: The Pathology and Treatment of Diseases of the Ovaries, p. 328. Schmalfuss: Zur Castration bei Neurosen. Arch. f. Gyn., 1885, Band xxvi., p. 1. Menzel: Beiträge zur Castration der Frauen. Arch. f. Gyn., 1885, Bd. xxvi., p. 36. Tissier: De la Castration de la Femme en Chirurgie. Thèse de Paris, 1885. Uherek: Arch. f. Gyn., xxvii., 3. L. Tait: British Medical Jour., 1886, p. 852. A Case of Hystero-epilepsy Successfully treated by Removal of Damaged Uterine Appendages. Lancet, 1887, ii., p. 1,213. Taufeer: Beiträge zur Lehre der Castration der Frauen. Zeitsch. f. Geb. und Gyn., Bd. ix., Heft 1. Schröder: Ueber die Castration bei Neurosen. Zeits. f. Geburts. und Gyn., Bd. xiii., Heft 2. Leopold: Archiv f. Gyn., Bd. xx., p. 88. Fehling: Zehn Castrationen. Archiv f. Gyn., Bd. xxii., Heft 3. Bruntzel: Arch. f. Gyn., Band xiv. Widmer: Centr. f. Gyn., 1886,

No. 40. Mundé: Amer. Jour. of Obstet., vol. xix., March, 1886, and vol. xxi., p. 35, January, 1888. Schramm: Ueber Castration bei Epilepsie. Berlin. klin. Woch., 1887, No. 3. Müller: Beiträge, etc. Deutsche Zeitschr. f. Chir., Bd. xx. Gustav Willers: Ueber die Berechtigung der Castr. der Frauen zur Heilung von Neurosen und Psychosen. Dissert. Inaug., Freiburg, 1887. Lucas Championnière: Trois Cas d'Ablation des Ovaires pour Accidents Nerveux. Soc. Obst. et Gyn. de Paris in Annales de Gyn., xxvii., p. 450. E. W. Cushing: Melancholia, Masturbation Cured by Removal of both Ovaries. Jour. of the Amer. Med. Assoc., Chicago, 1887, p. 441. Magnin: De la Castration chez la Femme comme Moyen Curatif des Troubles Nerveux. Thèse de Paris, 1886. Reamy: A Case of Oöphorectomy for Epilepsy. Americ. Jour. of Obstet., vol. xxi., p. 435. F. Merkel: Beiträge zur Kasuistik der Castration bei Neurosen, Nuremberg, 1888. May: A Case of Hystero-epilepsy; Tait's Operation; Cure. Virginia Med. Monthly, Richmond, 1888–89, xv., p. 174. Imlach: A Case of Hystero-epilepsy of Twenty Years' Duration Treated by Removal of the Uterine Appendages. British Med. Jour., 1888, i., p. 140.

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79. Bonnecaze: Valeur et Indication de l'Incision Vaginale Appliquée à l'Ablation de certaines petites Tumeurs de l'Ovaire et de la Trompe. Thèse de Paris, 1889.

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